

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2108	(((divinylene adj sulfide) CP34 (huile) Thiacyclopentadiene Thiofuran thiofurfuran thiole Thiophene "Thiophene-2,5-d2" thiotetrole) ((divinylene adj sulfide) CP34 (huile) \$3Thiacyclopentadiene \$3Thiofuran \$3thiofurfuran \$3thiole \$3Thiophene "Thiophene-2,5-d2" \$3thiotetrole)).clm.	US-PGPUB	OR	ON	2005/09/20 11:48
L3	493	(nlo or ((non-linear nonlinear) adj optical)).clm.	US-PGPUB	OR	ON	2005/09/20 11:48
L5	10	1 and 3	US-PGPUB	OR	ON	2005/09/20 11:50
L6	78147	(f "CF.sub.3\$" CN).clm.	US-PGPUB	OR	ON	2005/09/20 11:51
L7	952	1 and 6	US-PGPUB	OR	ON	2005/09/20 11:52
S1	2678	((252/582) or (549/29) or (549/58) or (549/60)).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/09/20 11:00
S2	325475	"2005".py.	US-PGPUB; USPAT; USOCR	OR	ON	2005/09/20 11:01
S3	56	S1 and S2	US-PGPUB; USPAT; USOCR	OR	ON	2005/09/20 11:08
S4	794	(549/59).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/09/20 11:20
S5	261	(252/583).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/09/20 11:23
S6	414	(546/94).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/09/20 11:27
S7	878	((549/474) or (549/475) or (549/476)).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/09/20 11:36
S8	493	(nlo or ((non-linear nonlinear) adj optical)).clm.	US-PGPUB	OR	ON	2005/09/20 11:48
S9	33	(pi near10 bridg\$).clm.	US-PGPUB	OR	ON	2005/09/20 11:40
S10	5	S8 and S9	US-PGPUB	OR	ON	2005/09/20 11:44

09/912,444

Connecting via Winsock to STN

Welcome to STN International! Enter x:x

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PASSWORD:

* * * * * RECONNECTED TO STN INTERNATIONAL * * * * *

SESSION RESUMED IN FILE 'REGISTRY' AT 09:31:12 ON 20 SEP 2005

FILE 'REGISTRY' ENTERED AT 09:31:12 ON 20 SEP 2005

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=>Testing the current file.... screen

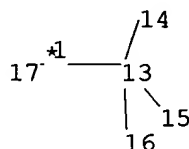
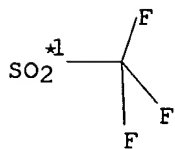
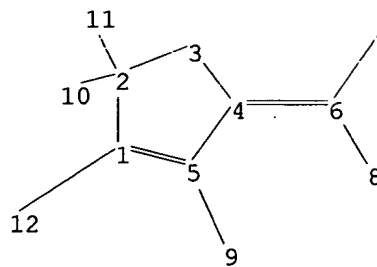
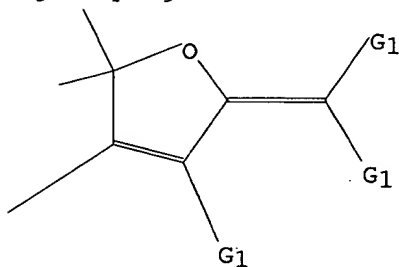
ENTER SCREEN EXPRESSION OR (END):end

=> screen 1968

L18 SCREEN CREATED

=>

Uploading c:\program files\stnexp\queries\09912444.str



chain nodes :

6 7 8 9 10 11 12 13 14 15 16 17 21 22 23 24 25

ring nodes :

1 2 3 4 5

chain bonds :

1-12 2-10 2-11 4-6 5-9 6-7 6-8 10-23 10-24 11-21 11-22 12-25 13-14
13-15 13-16 13-17

ring bonds :

1-2 1-5 2-3 3-4 4-5

exact/norm bonds :

9/20/2005

09/912,444

1-2 1-5 2-3 3-4 4-5 5-9 6-7 6-8

exact bonds :

1-12 2-10 2-11 4-6 10-23 10-24 11-21 11-22 12-25 13-14 13-15 13-16
13-17

G1:CF3,CN,F,[*1]

Match level :

1:Atom 2:Atom 3:Atom 4:Atom 5:Atom 6:CLASS 7:CLASS 8:CLASS 9:CLASS
10:CLASS 11:CLASS 12:CLASS 13:CLASS 14:CLASS 15:CLASS 16:CLASS 17:CLASS
21:CLASS 22:CLASS 23:CLASS 24:CLASS 25:CLASS

L19 STRUCTURE UPLOADED

=> que L19 AND L18

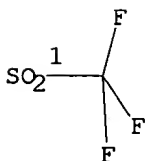
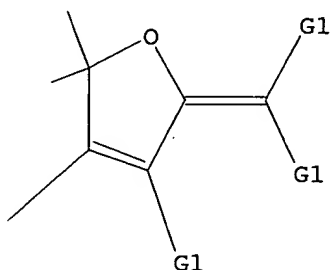
L20 QUE L19 AND L18

=> d 120

L20 HAS NO ANSWERS

L18 SCR 1968

L19 STR



G1 CF3,CN,F,[@1]

Structure attributes must be viewed using STN Express query preparation.

L20 QUE L19 AND L18

=> s sample 120

9/20/2005

09/912,444

SAMPLE SEARCH INITIATED 09:32:02 FILE 'REGISTRY'
SAMPLE SCREEN SEARCH COMPLETED - 5 TO ITERATE

100.0% PROCESSED 5 ITERATIONS 3 ANSWERS
SEARCH TIME: 00.00.01

FULL FILE PROJECTIONS: ONLINE **COMPLETE**
BATCH **COMPLETE**
PROJECTED ITERATIONS: 5 TO 234
PROJECTED ANSWERS: 3 TO 163

L21 3 SEA SSS SAM L19 AND L18

=> s l21 sss full

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FULL SCREEN SEARCH COMPLETED - 90 TO ITERATE

100.0% PROCESSED 90 ITERATIONS 51 ANSWERS
SEARCH TIME: 00.00.01

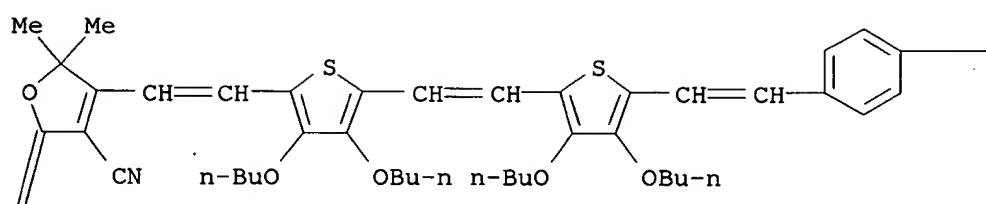
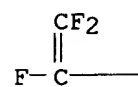
L22 51 SEA SSS FUL L19 AND L18

=> d

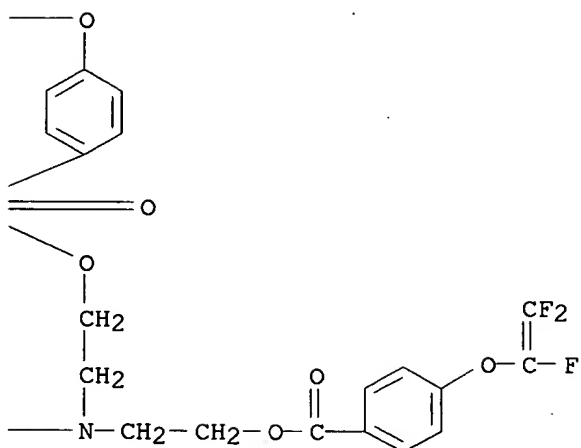
L22 ANSWER 1 OF 51 REGISTRY COPYRIGHT 2005 ACS on STN
RN 851745-60-3 REGISTRY
ED Entered STN: 06 Jun 2005
CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[2-[3,4-dibutoxy-5-[2-[3,4-dibutoxy-5-[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)
MF C68 H68 F6 N4 O11 S2
SR CA
LC STN Files: CA, CAPLUS, USPATFULL

9/20/2005

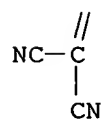
PAGE 1-A



PAGE 1-B



PAGE 2-A



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

5 REFERENCES IN FILE CA (1907 TO DATE)
5 REFERENCES IN FILE CAPLUS (1907 TO DATE)

=> d 51

L22 ANSWER 51 OF 51 REGISTRY COPYRIGHT 2005 ACS on STN

RN 259653-89-9 REGISTRY

ED Entered STN: 21 Mar 2000

CN 1,3-Benzenedicarbonyl dichloride, 2,4,5,6-tetrafluoro-, polymer with [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

OTHER CA INDEX NAMES:

CN Phenol, 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis-, polymer with [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile and 2,4,5,6-tetrafluoro-1,3-benzenedicarbonyl dichloride (9CI)

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-, polymer with 2,4,5,6-tetrafluoro-1,3-benzenedicarbonyl dichloride and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI)

MF (C39 H48 N4 O3 . C15 H10 F6 O2 . C8 Cl2 F4 O2)x

CI PMS

PCT Polyamine, Polyester, Polyester formed, Polystyrene, Polyvinyl

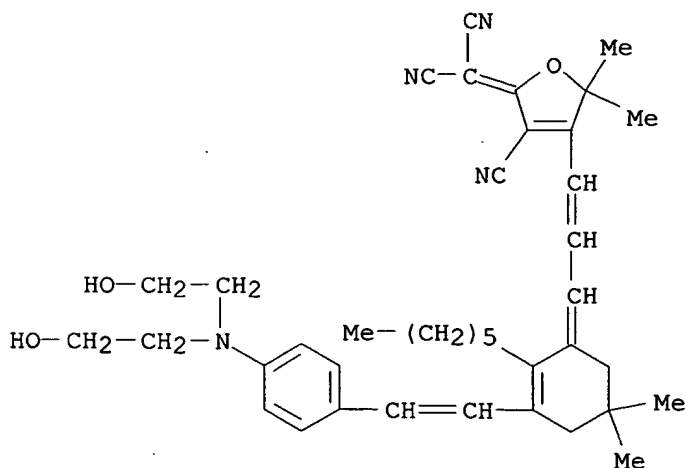
SR CA

LC STN Files: CA, CAPLUS

CM 1

CRN 259653-88-8

CMF C39 H48 N4 O3

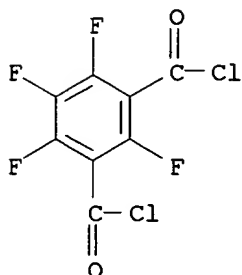


9/20/2005

09/912,444

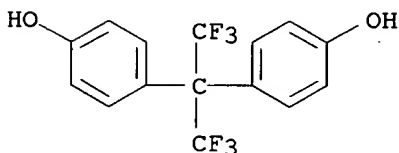
CM 2

CRN 110649-97-3
CMF C8 C12 F4 O2



CM 3

CRN 1478-61-1
CMF C15 H10 F6 O2



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

2 REFERENCES IN FILE CA (1907 TO DATE)
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

=> => file ca

FILE 'CA' ENTERED AT 09:33:42 ON 20 SEP 2005
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FILE LAST UPDATED: 15 Sep 2005 (20050915/ED)

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This file contains CAS Registry Numbers for easy and accurate substance identification.

=> s 122

L23 36 L22

=> s nlo or (nonlinear optical)

4543 NLO
147333 NONLINEAR
749261 OPTICAL
31130 NONLINEAR OPTICAL
(NONLINEAR(W)OPTICAL)

L24 32968 NLO OR (NONLINEAR OPTICAL)

=> s 123 and 124

L25 28 L23 AND L24

=> d 28 all

L25 ANSWER 28 OF 28 CA COPYRIGHT 2005 ACS on STN

AN 135:336715 CA

ED Entered STN: 22 Nov 2001

TI Sterically stabilized polyene-bridged second-order **nonlinear optical** chromophores and devices incorporating the same

IN Zhang, Cheng; Fetterman, Harold R.; Steier, William; Michael, Joseph

PA Pacific Wave Industries, Inc., USA

SO PCT Int. Appl., 64 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM F21V009-00

ICS G02F001-00; G02F001-03

CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 41

FAN.CNT 10

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PI	WO 2001079750	A1	20011025	WO 2001-US12354	20010416
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	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	US 6348992	B1	20020219	US 2000-551685	20000418

9/20/2005

PRAI US 2000-551685	A	20000418
US 1998-122806	A2	19980727
US 2000-488422	A2	20000120
US 2000-546930	A2	20000411

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2001079750	ICM	F21V009-00
	ICS	G02F001-00; G02F001-03
WO 2001079750	ECLA	G02F001/361B; G02F001/361B2; G02F001/361D; G02F001/361D2
US 6348992	NCL	359/321.000; 252/582.000; 359/345.000
	ECLA	C08K005/00P4; C09B023/00D; C09B023/00R; C09B023/00S; C09B023/14H; G02F001/065; G02F001/361B; G02F001/361B2; G02F001/361D; G02F001/361D2; G02F001/361F

OS MARPAT 135:336715

AB **Nonlinear optical** devices (e.g., electrooptical modulators, phase shifters) are described which employ an active element formed from a chromophore including an electron donor group, an electron acceptor group, and a π -conjugate bridge structure between the electron donor group and the electron acceptor group which includes ≥ 1 non-aromatic 5-, 6-, or 7-membered ring which lock(s) one or two carbon-carbon double bond(s) of the conjugate bridge structure and in which the electron acceptor group is connected to the bridge ring structure with a conjugated diene or triene. The bridge may contain a bithiophene unit. The chromophores may be doped into a polymer, preferably a bisphenol A carbonate-4,4'-(3,3,5-trimethylcyclohexylidene)diphenol carbonate copolymer. The devices may be packaged in inert gas filled packages.

ST polyene bridged **nonlinear optical** chromophore device

IT Electrooptical modulators

Nonlinear optical materials(nonlinear optical devices employing sterically stabilized polyene-bridged second-order **nonlinear optical** chromophores)

IT Optical instruments

(nonlinear; **nonlinear optical** devices employing sterically stabilized polyene-bridged second-order **nonlinear optical** chromophores)

IT Optical instruments

(phase shifters; **nonlinear optical** devices employing sterically stabilized polyene-bridged second-order **nonlinear optical** chromophores)

IT 78-59-1, Isophorone

RL: RCT (Reactant); RACT (Reactant or reagent)

(Sterically stabilized polyene-bridged second-order **nonlinear optical** chromophores and devices incorporating the same)

IT	132721-26-7	224784-30-9	265992-52-7	266348-40-7	266348-41-8
	296280-34-7	350251-11-5	351444-91-2	351444-93-4	351444-95-6
	351444-98-9	351445-03-9	351445-05-1		

RL: DEV (Device component use); USES (Uses)

(nonlinear optical devices employing sterically stabilized polyene-bridged second-order **nonlinear optical** chromophores)

IT 369609-51-8

RL: DEV (Device component use); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)

(nonlinear optical devices employing sterically

stabilized polyene-bridged second-order **nonlinear optical** chromophores)

IT 259653-88-8P 351444-86-5P 369397-06-8P
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
 (nonlinear **optical** devices employing sterically stabilized polyene-bridged second-order **nonlinear optical** chromophores)

IT 109-77-3, Malononitrile 492-97-7, 2,2'-Bithiophene 1193-93-7
 1826-67-1, Vinylmagnesium bromide 2052-06-4 3761-92-0, Hexylmagnesium bromide 6502-13-2 7726-95-6, Bromine, reactions 27913-86-6
 127278-74-4 224768-42-7, 2-Hexylisophorone 326597-50-6 369395-86-8
369609-49-4
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (nonlinear **optical** devices employing sterically stabilized polyene-bridged second-order **nonlinear optical** chromophores)

IT 10276-21-8P 51751-44-1P, 3,3'-Dibromo-2,2'-bithiophene 125143-53-5P, 3,3',5,5'-Tetrabromo-2,2'-bithiophene 125607-30-9P, 3,3'-Dihexyl-2,2'-bithiophene 171082-32-9P 224768-43-8P 224784-25-2P 224784-26-3P
 224784-28-5P 326597-43-7P 351444-78-5P 369395-61-9P 369396-01-0P
 369396-52-1P 369396-68-9P 369397-34-2P 369397-35-3P 369397-36-4P
 369397-37-5P
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
 (nonlinear **optical** devices employing sterically stabilized polyene-bridged second-order **nonlinear optical** chromophores)

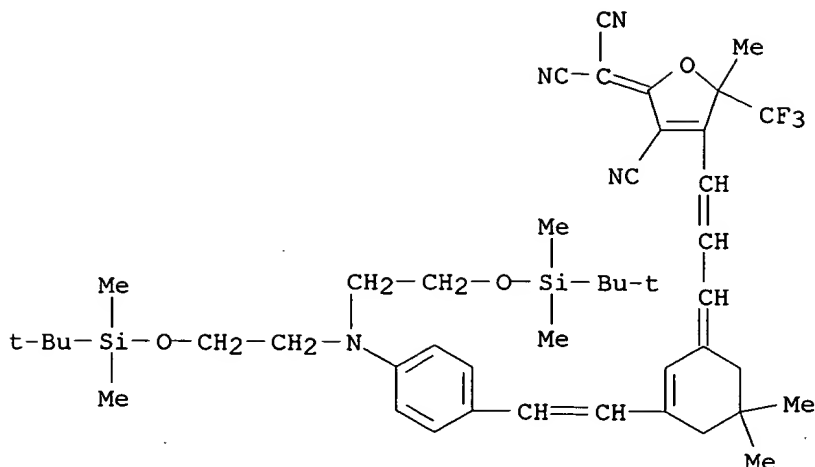
RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
 (1) Dalton; US 6067186 A 2000 CA
 (2) Drost; US 5718845 A 1998

=> d hitstr 28

L25 ANSWER 28 OF 28 CA COPYRIGHT 2005 ACS on STN

IT **369609-51-8**
 RL: DEV (Device component use); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
 (nonlinear **optical** devices employing sterically stabilized polyene-bridged second-order **nonlinear optical** chromophores)

RN 369609-51-8 CA
 CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

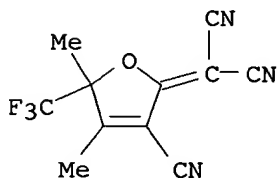


IT 369609-49-4

RL: RCT (Reactant); RACT (Reactant or reagent)
 (nonlinear optical devices employing sterically
 stabilized polyene-bridged second-order nonlinear
 optical chromophores)

RN 369609-49-4 CA

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(trifluoromethyl)-2(5H)-
 furanylidene]- (9CI) (CA INDEX NAME)



=> => d hitstr,ab 27

L25 ANSWER 27 OF 28 CA COPYRIGHT 2005 ACS on STN

IT 392662-53-2P

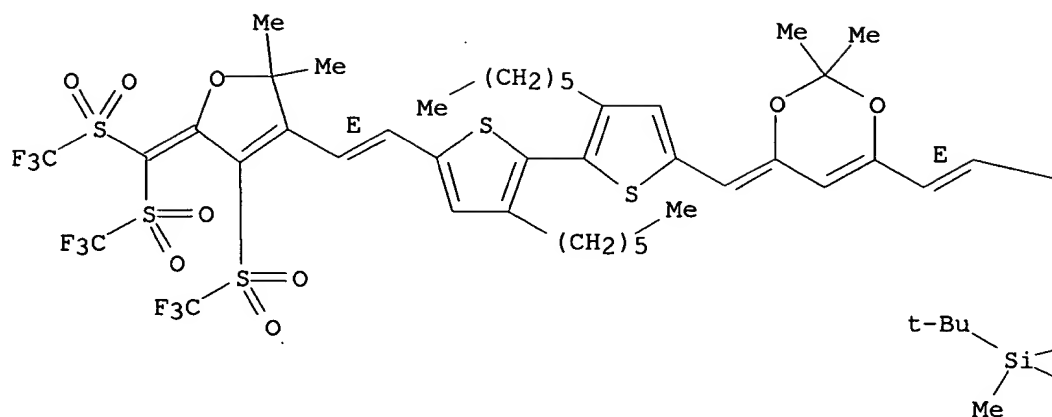
RL: IMF (Industrial manufacture); TEM (Technical or engineered material
 use); PREP (Preparation); USES (Uses)
 (red chromophore; production of donor-acceptor conjugated hyperpolarizable
 heterocyclic organic chromophores)

RN 392662-53-2 CA

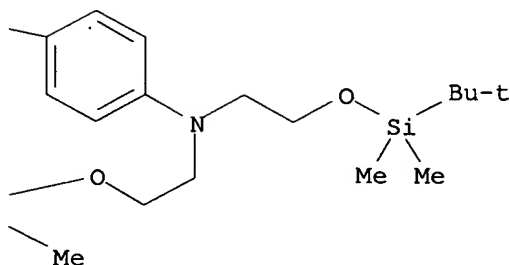
CN Benzenamine, 4-[(1E)-2-[4-[[5'-[(1E)-2-[5-[bis[(trifluoromethyl)sulfonyl]m
 ethylene]-2,5-dihydro-2,2-dimethyl-4-[(trifluoromethyl)sulfonyl]-3-
 furanyl]ethenyl]-3,3'-dihexyl[2,2'-bithiophen]-5-yl]methylene]-2,2-
 dimethyl-4H-1,3-dioxin-6-yl]ethenyl]-N,N-bis[2-[(1,1-
 dimethylethyl)dimethylsilyl]oxy]ethyl]- (9CI) (CA INDEX NAME)

Double bond geometry as described by E or Z.

PAGE 1-A



PAGE 1-B



AB The present invention provides hyperpolarizable organic chromophores based on heterocyclic compds. The chromophores are nonlinear optically active compds. that include a π -donor conjugated to a π -acceptor through a π -electron conjugated bridge. Macromol. structures including the hyperpolarizable organic chromophores are also provided.

=> d all 27

L25 ANSWER 27 OF 28 CA COPYRIGHT 2005 ACS on STN

AN 136:136245 CA

ED Entered STN: 21 Feb 2002

TI Hyperpolarizable organic chromophores

IN Dalton, Larry R.; Jen, Alex Kwan-Yue; Londergan, Timothy; Carlson, William Brenden; Phelan, Gregory; Huang, Diyun; Casmier, Daniel; Ewy, Todd; Buker, Nicholas

PA University of Washington, USA

SO PCT Int. Appl., 104 pp.

9/20/2005

09/912,444

CODEN: PIXXD2
DT Patent
LA English
IC ICM C07D305-00
ICS C07D307-00; C07D327-00; C07D409-00
CC 41-11 (Dyes, Organic Pigments, Fluorescent Brighteners, and Photographic Sensitizers)
Section cross-reference(s): 25, 27, 28

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002008215	A1	20020131	WO 2001-US23339	20010724
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	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	CA 2417000	AA	20020131	CA 2001-2417000	20010724
	US 2002084446	A1	20020704	US 2001-912444	20010724
	EP 1305305	A1	20030502	EP 2001-957237	20010724
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
	JP 2004508430	T2	20040318	JP 2002-514121	20010724
	US 2005179013	A1	20050818	US 2005-77607	20050311
PRAI	US 2000-220321P	P	20000724		
	US 2001-912444	A1	20010724		
	WO 2001-US23339	W	20010724		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2002008215	ICM	C07D305-00
	ICS	C07D307-00; C07D327-00; C07D409-00
WO 2002008215	ECLA	C07D307/36; C07D307/54; C07D307/56C; C07D307/66; C07D319/06; C07D333/24; C07D409/06+333B+307B; C07D495/04+333B+319B; C07D495/04+333B+333B; C07D519/00+471/00+195/00; C07F007/08C6B4; C09B023/00R; C09B023/10B; C09B069/10H
US 2002084446	NCL	252/582.000
	ECLA	C07D307/36; C07D495/04+333B+319B; C07D519/00+471/00+195/00; C07F007/08C6B4; C09B023/00R; C09B023/10B; C09B069/10H; C07D307/54; C07D307/56C; C07D307/66; C07D319/06; C07D333/24; C07D409/06+333B+307B; C07D495/04+333B+333B
EP 1305305	ECLA	C07D307/36; C07D307/54; C07D307/56C; C07D307/66; C07D319/06; C07D333/24; C07D409/06+333B+307B; C07D495/04+333B+319B; C07D495/04+333B+333B; C07D519/00+471/00+195/00; C07F007/08C6B4; C09B023/00R; C09B023/10B; C09B069/10H
JP 2004508430	FTERM	4C063/AA03; 4C063/BB01; 4C063/CC92; 4C063/DD75; 4C063/EE10; 4C071/AA01; 4C071/BB01; 4C071/CC12; 4C071/CC21; 4C071/CC22; 4C071/DD04; 4C071/EE13; 4C071/FF16; 4C071/FF23; 4C071/GG05; 4C071/JJ01; 4C071/JJ06; 4C071/LL05; 4C072/MM08; 4H049/VN01; 4H049/VP02; 4H049/VQ57; 4H049/VR24; 4H049/VU29;

9/20/2005

4H056/CA01; 4H056/CA03; 4H056/CA05; 4H056/CB06;
 4H056/CC02; 4H056/CC04; 4H056/CD08; 4H056/CE02
 US 2005179013 NCL 252/582.000
 ECLA C07D307/36; C07D307/54; C07D307/56C; C07D307/66;
 C07D319/06; C07D333/24; C07D409/06+333B+307B;
 C07D495/04+333B+319B; C07D495/04+333B+333B;
 C07D519/00+471/00+195/00; C07F007/08C6B4; C09B023/00R;
 C09B023/10B; C09B069/10H
 OS MARPAT 136:136245
 AB The present invention provides hyperpolarizable organic chromophores based on
 heterocyclic compds. The chromophores are nonlinear optically active
 compds. that include a π -donor conjugated to a π -acceptor through a
 π -electron conjugated bridge. Macromol. structures including the
 hyperpolarizable organic chromophores are also provided.
 ST heterocyclic org chromophore hyperpolarizable **nonlinear**
optical prodn; donor acceptor conjugated hyperpolarizable
 heterocyclic org chromophore prodn
 IT Chromophores
 Nonlinear optical materials
 Optical hyperpolarizability
 (production of donor-acceptor conjugated hyperpolarizable heterocyclic
 organic chromophores)
 IT Dendritic polymers
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material
 use); PREP (Preparation); USES (Uses)
 (production of donor-acceptor conjugated hyperpolarizable heterocyclic
 organic chromophores)
 IT 392662-44-1P 392662-45-2P
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material
 use); PREP (Preparation); USES (Uses)
 (chromophore; production of donor-acceptor conjugated hyperpolarizable
 heterocyclic organic chromophores)
 IT 392662-55-4P
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material
 use); PREP (Preparation); USES (Uses)
 (dendrimer chromophore; production of donor-acceptor conjugated
 hyperpolarizable heterocyclic organic chromophores)
 IT 392662-59-8P 392662-63-4P
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material
 use); PREP (Preparation); USES (Uses)
 (green chromophore; production of donor-acceptor conjugated
 hyperpolarizable heterocyclic organic chromophores)
 IT 111-25-1P, Hexyl bromide 4181-05-9P, 4-(Diphenylamino)benzaldehyde
 10419-77-9P 20440-94-2P, N,N-Bis(4-methoxyphenyl)aniline 25069-40-3P
 51751-44-1P, 3,3'-Dibromo-2,2'-bithiophene 81956-28-7P 81956-31-2P
 89115-20-8P, 4-[Bis(4-methoxyphenyl)amino]benzaldehyde 125143-53-5P,
 3,3',5,5'-Tetrabromo-2,2'-bithiophene 125607-30-9P, 3,3'-Dihexyl-2,2'-
 bithiophene 183994-95-8P 351444-78-5P 390417-74-0P 392662-42-9P
 392662-43-0P 392662-46-3P 392662-47-4P 392662-48-5P 392662-49-6P
 392662-50-9P 392662-51-0P 392662-52-1P 392662-57-6P 392662-58-7P
 392662-61-2P 392662-62-3P 392662-64-5P 392662-66-7P
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT
 (Reactant or reagent)
 (intermediate; production of donor-acceptor conjugated hyperpolarizable
 heterocyclic organic chromophores)
 IT 392662-53-2P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(red chromophore; production of donor-acceptor conjugated hyperpolarizable heterocyclic organic chromophores)

IT 62-53-3, Aniline, reactions 67-72-1, Hexachloroethane 68-12-2, DMF, reactions 104-92-7, 4-Bromoanisole 106-41-2, p-Bromophenol 120-21-8, 4-(Diethylamino)benzaldehyde 121-43-7, Trimethyl borate 128-08-5, N-Bromosuccinimide 492-97-7, 2,2'-Bithiophene 603-34-9, Triphenylamine 762-04-9, Diethyl phosphonate 5394-63-8 6399-81-1, Triphenylphosphonium bromide 7726-95-6, Bromine, reactions 24131-32-6 28917-44-4, 3,5-Bis(benzyloxy)benzoyl chloride 31486-86-9, Thieno[3,2-b]thiophene-2-carboxaldehyde 37882-75-0 50653-68-4 127278-74-4 171082-32-9 211235-87-9 261779-11-7 392662-54-3 392662-56-5 392662-60-1 392662-65-6

RL: RCT (Reactant); RACT (Reactant or reagent)

(starting material; production of donor-acceptor conjugated hyperpolarizable heterocyclic organic chromophores)

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

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- (2) Frigoli; US 6281366 B1 2001 CA
- (3) Herzig; US 5693734 A 1997 CA
- (4) Ippoliti; US 6211374 B1 2001 CA
- (5) Momoda; US 5808100 A 1998 CA

=> => d all,hitstr 1-26

L25 ANSWER 1 OF 28 CA COPYRIGHT 2005 ACS on STN

AN 143:154013 CA

ED Entered STN: 18 Aug 2005

TI Low temperature relaxations and effects on poling efficiencies of dendronized **nonlinear optical** side-chain polymers

AU Gray, Tomoko; Overney, Rene M.; Haller, Marnie; Luo, Jingdong; Jen, Alex K.-Y.

CS Department of Chemical Engineering, University of Washington, Seattle, WA, 98195-1750, USA

SO Applied Physics Letters (2005), 86(21), 211908/1-211908/3
CODEN: APPLAB; ISSN: 0003-6951

PB American Institute of Physics

DT Journal

LA English

CC 36-5 (Physical Properties of Synthetic High Polymers)

AB Low temperature relaxations in a dendronized **nonlinear optical** (NLO) side-chain polymer take place at >20° below the glass transition temperature. Relaxations of localized mobilities, removed from long range relaxations responsible for chromophore aggregation, offer new gateways for optimized acentric ordering of the chromophores. Supreme electrooptical (EO) activity was achieved by elec. poling close to the critical temps. of localized mobilities identified as dendronized **NLO** side-chain relaxations. In particular, a new instrumental approach to relaxation studies of thin spin-coated **NLO** polymer films was tried; the shear-modulation force microscopy (SM-FM) method. Originating from scanning force microscopy (SFM), the SM-FM method grants access to the detection of low temperature relaxations in constrained thin **NLO** films not obtainable by conventional means.

ST **nonlinear optical** side chain polymer low temp thermomech relaxation

- IT Electrooptical effect
(activity; low temperature relaxations and effects on poling efficiencies of dendronized **nonlinear optical** side-chain polymers)
- IT Optical activity
(electrooptical; low temperature relaxations and effects on poling efficiencies of dendronized **nonlinear optical** side-chain polymers)
- IT **Nonlinear optical** materials
Thermomechanical properties
(low temperature relaxations and effects on poling efficiencies of dendronized **nonlinear optical** side-chain polymers)
- IT Fluoropolymers, properties
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
(low temperature relaxations and effects on poling efficiencies of dendronized **nonlinear optical** side-chain polymers)
- IT **502558-68-1P**
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
(low temperature relaxations and effects on poling efficiencies of dendronized **nonlinear optical** side-chain polymers)

RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

- (1) Buenviaje, C; Macromol Symp 2001, V167, P201 CA
- (2) Burland, D; Chem Rev (Washington, DC) 1994, V94, P31 CA
- (3) Dalton, L; Opt Mater (Amsterdam, Neth) 2002, V21, P19
- (4) Dureiko, R; J Opt Soc Am B 1998, V15, P338 CA
- (5) Ge, S; Phys Rev Lett 2000, V85, P2340 CA
- (6) Gray, T; Appl Phys Lett 2003, V83, P2563 CA
- (7) Kajzar, F; Adv Polym Sci 2003, V161, P1 CA
- (8) Luo, J; Adv Mater (Weinheim, Ger) 2002, V14, P1763 CA
- (9) Ma, H; Adv Funct Mater 2002, V12, P565 CA
- (10) Ma, H; Adv Mater (Weinheim, Ger) 2002, V14, P1339 CA
- (11) Marder, S; Science 1994, V263, P1706 CA
- (12) Marks, T; Angew Chem, Int Ed Engl 1995, V34, P155 CA
- (13) Overney, R; Handbook of Micro/Nano Tribology 2003
- (14) Overney, R; J Therm Anal Calorim 2000, V59, P205 CA
- (15) Robinson, B; J Phys Chem A 2000, V104, P4785 CA
- (16) Shi, Y; Science 2000, V288, P199
- (17) Sills, S; J Chem Phys 2004, V120, P5334 CA
- (18) Teng, C; Appl Phys Lett 1990, V56, P1734 CA
- (19) Teraoka, I; J Appl Phys 1991, V69, P2568 CA
- (20) Winkelhahn, H; Phys Chem 1996, V100, P123
- (21) Zhang, C; Chem Mater 2001, V13, P3043 CA

- IT **502558-68-1P**
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
(low temperature relaxations and effects on poling efficiencies of dendronized **nonlinear optical** side-chain polymers)

RN 502558-68-1 CA

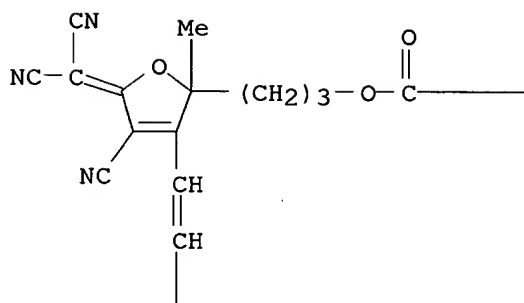
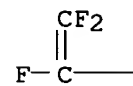
CN Phenol, 4-ethenyl-, homopolymer, 6-[[4-[2-[3-[3-[2-[3-[[3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]benzoyl]oxy]propyl]-4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-3-furanyl]-2-propenylidene]-5,5-dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]ethylamino]hexyl 1,2-benzenedicarboxylate 4-[(trifluoroethenyl)oxy]benzoate (9CI) (CA INDEX NAME)

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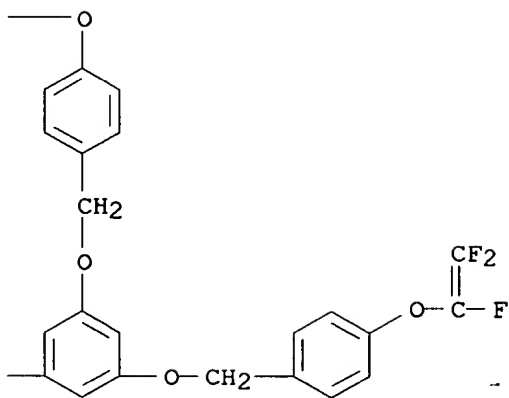
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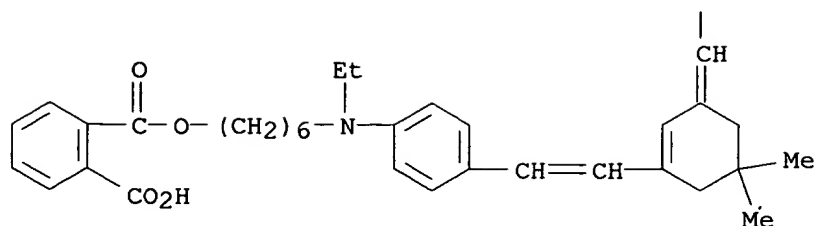
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PAGE 1-B

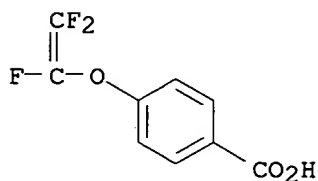




CM 2

CRN 134151-66-9

CMF C9 H5 F3 O3



CM 3

CRN 24979-70-2

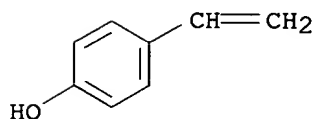
CMF (C8 H8 O)_x

CCI PMS

CM 4

CRN 2628-17-3

CMF C8 H8 O



L25 ANSWER 2 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 142:464469 CA
 ED Entered STN: 09 Jun 2005
 TI Crosslinked compositions comprising a poly(arylene ether) and a
 nonlinearoptical chromophore, and devices incorporating same
 IN Huang, Diyun; Londergan, Timothy M.
 PA USA
 SO U.S. Pat. Appl. Publ., 23 pp.
 CODEN: USXXCO
 DT Patent
 LA English
 IC ICM C08G002-00
 INCL 528086000

9/20/2005

CC 37-3 (Plastics Manufacture and Processing)
Section cross-reference(s): 73

FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2005107569	A1	20050519	US 2003-714387	20031114
	WO 2005049680	A2	20050602	WO 2004-US37885	20041112
	WO 2005049680	A3	20050804		
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	RW:	BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
PRAI	US 2003-713469	A	20031114		
	US 2003-714266	A	20031114		
	US 2003-714356	A	20031114		
	US 2003-714387	A	20031114		
	US 2003-714837	A	20031114		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2005107569	ICM	C08G002-00
	INCL	528086000
US 2005107569	NCL	528/086.000

GI

* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT *

AB A composition is made by a process comprising (a) providing precursor composition comprising a **nonlinear optical** chromophore having the structure D- π -A and a polymer I and (b) crosslinking the polymer, wherein: D is a donor; p is a p-bridge; A is an acceptor; Q1 comprises at least one aryl or heteroaryl group; Q2 comprises at least one aryl or heteroaryl group; X1 is O bonded directly to an aryl carbon of Q1; X2 is O bonded directly to an aryl carbon of Q2; Z is a linker comprising at least one --C(R2)2-- group; Y is a single bond or a linker group; R1 is independently at each occurrence H, a halogen, an alkyl group, a heteroalkyl group, an aryl group, or a heteroaryl group; R2 is independently at each occurrence H, an alkyl group, or a heteroalkyl group; and R3 is H or a crosslinkable group. Also featured are electro-optic devices incorporating these blends. A **nonlinear optical** material contained Decafluorobiphenyl-3,5-dihydroxybenzylalc.-4,4'-(1-phenylethylidene)bisphenol copolymer ester with 4-trifluorovinylloxybenzoyl chloride and II.

ST crosslinkable polyoxyarylene chromophore **nonlinear optical**

IT Chromophores
Electrooptical instruments

Nonlinear optical materials
 Optical waveguides
 (poly(arylene ethers) with pendant crosslinkable groups, and devices incorporating same)

IT Polyoxyarylenes
 RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (poly(arylene ethers) with pendant crosslinkable groups, and devices incorporating same)

IT **851745-60-3**
 RL: TEM (Technical or engineered material use); USES (Uses)
 (chromophore; poly(arylene ethers) with pendant crosslinkable groups, and devices incorporating same)

IT 851770-28-0P
 RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (poly(arylene ethers) with pendant crosslinkable groups, and devices incorporating same)

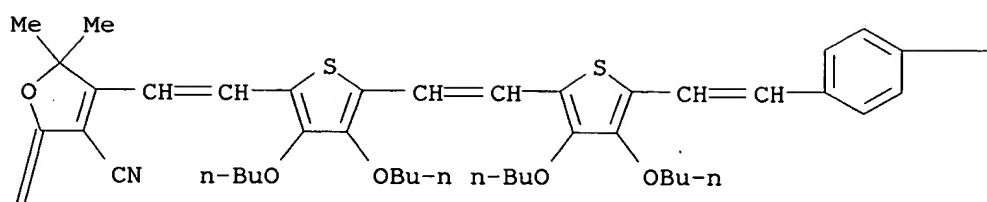
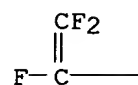
IT 851770-30-4P 851770-32-6P
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (poly(arylene ethers) with pendant crosslinkable groups, and devices incorporating same)

IT **851745-60-3**
 RL: TEM (Technical or engineered material use); USES (Uses)
 (chromophore; poly(arylene ethers) with pendant crosslinkable groups, and devices incorporating same)

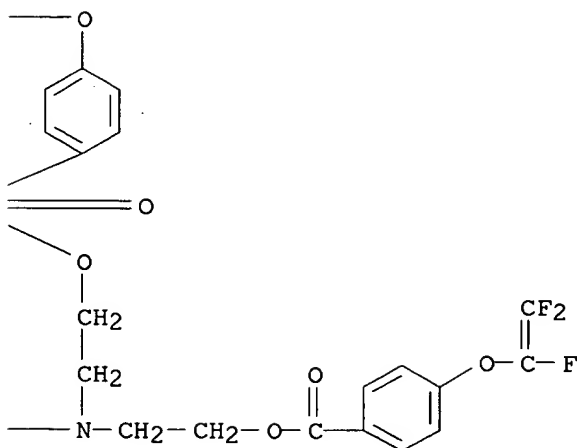
RN 851745-60-3 CA

CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[2-[3,4-dibutoxy-5-[2-[3,4-dibutoxy-5-[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

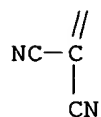
PAGE 1-A



PAGE 1-B



PAGE 2-A



L25 ANSWER 3 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 142:464468 CA
 ED Entered STN: 09 Jun 2005
 TI Process for preparing poly(arylene ethers) with pendant crosslinkable groups
 IN Chen, Baoquan; Londergan, Timothy M.
 PA USA
 SO U.S. Pat. Appl. Publ., 21 pp.
 CODEN: USXXCO
 DT Patent
 LA English
 IC ICM C08G002-00
 INCL 528086000
 CC 37-3 (Plastics Manufacture and Processing)
 Section cross-reference(s): 73

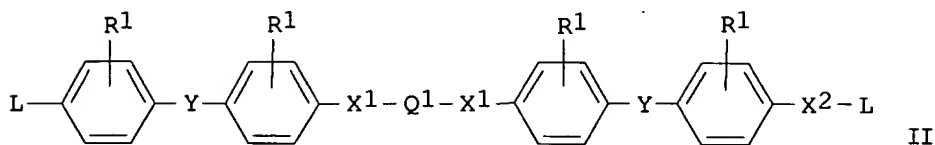
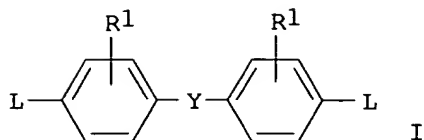
FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2005107568	A1	20050519	US 2003-714356	20031114
	WO 2005049680	A2	20050602	WO 2004-US37885	20041112
	WO 2005049680	A3	20050804		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW			
	RW:	BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
PRAI	US 2003-713469	A	20031114		
	US 2003-714266	A	20031114		
	US 2003-714356	A	20031114		
	US 2003-714387	A	20031114		
	US 2003-714837	A	20031114		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2005107568	ICM	C08G002-00
	INCL	528086000
US 2005107568	NCL	528/086.000

GI



- AB The process comprises: (a) reacting a diphenol monomer A (HX1-Q1-X1H) with a monomer B (I) having two locations for reaction with A to form arylene ether monomer C (II) and (b) reacting arylene ether monomer C with a diphenol monomer D (HX2Q2(ZOH)X2H) to form a polymer, wherein: Q1 comprises at least one aryl or heteroaryl group; Q2 comprises at least one aryl or heteroaryl group; X1 is O bonded directly to an aryl carbon of Q1; X2 is O bonded directly to an aryl carbon of Q2; Z is a linker comprising at least one -C(R2)2- group; Y is a single bond or linker group (e.g., comprising up to about 50 carbons); R1 is independently at each occurrence H, a halogen, an alkyl group, a heteroalkyl group, an aryl group, or a heteroaryl group; R2 is independently at each occurrence H, an alkyl group, or a heteroalkyl group; and R3 is H or a crosslinkable group. A polymer was prepared by reaction of decafluorobiphenyl and 3,5-dihydroxybenzylalcl., and esterification with 4-trifluorovinylbenzoyl chloride.
- ST crosslinkable polyoxyarylene prepn
- IT Chromophores

Nonlinear optical materials

(process for preparing poly(arylene ethers) with pendant crosslinkable groups)

IT Polyoxyarylenes

RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(process for preparing poly(arylene ethers) with pendant crosslinkable groups)

IT 851745-60-3

RL: TEM (Technical or engineered material use); USES (Uses)
(chromophore; process for preparing poly(arylene ethers) with pendant crosslinkable groups)

IT 851770-28-0P

RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(process for preparing poly(arylene ethers) with pendant crosslinkable groups)

IT 851770-30-4P 851770-32-6P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(process for preparing poly(arylene ethers) with pendant crosslinkable groups)

IT 851745-60-3

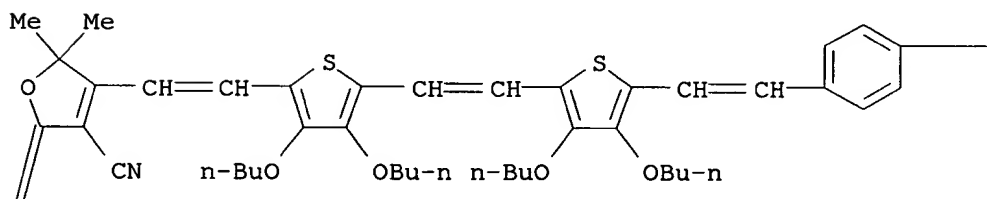
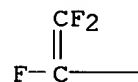
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(chromophore; process for preparing poly(arylene ethers) with pendant crosslinkable groups)

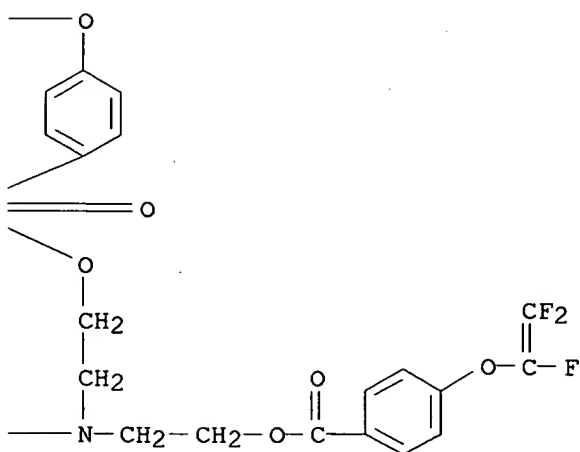
RN 851745-60-3 CA

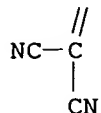
CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[2-[3,4-dibutoxy-5-[2-[3,4-dibutoxy-5-[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B





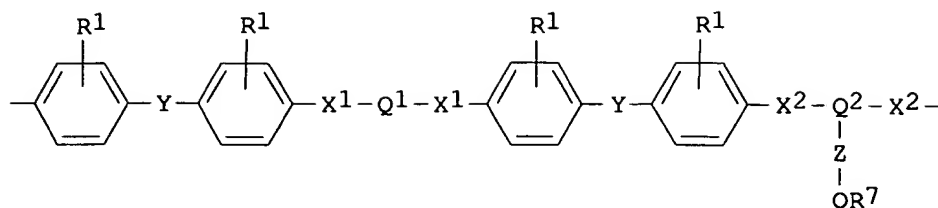
L25 ANSWER 4 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 142:464467 CA
 ED Entered STN: 09 Jun 2005
 TI Poly(arylene ethers) with pendant crosslinkable groups, and devices
 incorporating same
 IN Londergan, Timothy M.
 PA USA
 SO U.S. Pat. Appl. Publ., 22 pp.
 CODEN: USXXCO
 DT Patent
 LA English
 IC ICM C08G002-00
 INCL 528086000
 CC 37-3 (Plastics Manufacture and Processing)
 Section cross-reference(s): 73
 FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2005107567	A1	20050519	US 2003-713469	20031114
	WO 2005049680	A2	20050602	WO 2004-US37885	20041112
	WO 2005049680	A3	20050804		
	W:				
	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH,				
	CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,				
	GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,				
	LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI,				
	NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY,				
	TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW:				
	BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM,				
	AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK,				
	EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LU, MC, NL, PL, PT, RO,				
	SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR,				
	NE, SN, TD, TG				
PRAI	US 2003-713469	A	20031114		
	US 2003-714266	A	20031114		
	US 2003-714356	A	20031114		
	US 2003-714387	A	20031114		
	US 2003-714837	A	20031114		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2005107567	ICM	C08G002-00
	INCL	528086000
US 2005107567	NCL	528/086.000

GI



I

- AB A polymer comprises units I, wherein: Q1 comprises at least one aryl or heteroaryl group; Q2 comprises at least one aryl or heteroaryl group; X1 is O bonded directly to an aryl carbon of Q1; X2 is O bonded directly to an aryl carbon of Q2; Z is a linker comprising at least one $-(C(R_2)_2)-$ group; Y is a single bond or linker group (e.g., comprising up to about 50 carbons); R1 is independently at each occurrence H, a halogen, an alkyl group, a heteroalkyl group, an aryl group, or a heteroaryl group; R2 is independently at each occurrence H, an alkyl group, or a heteroalkyl group; and R3 is H or a crosslinkable group. The polymers are useful with chromophores in **nonlinear optical** materials. A crosslinkable polymer was prepared by reaction of decafluorobiphenyl and 4,4'-(1-phenylethylidene)bisphenol, polymerization with 3,5-dihydroxybenzylalco., and esterification with 4-trifluorovinyl oxybenzoyl chloride.
- ST crosslinkable polyoxyarylene **nonlinear optical** material
- IT Chromophores
Nonlinear optical materials
 Optical waveguides
 (poly(arylene ethers) with pendant crosslinkable groups, and devices incorporating same)
- IT Polyoxyarylenes
 RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (poly(arylene ethers) with pendant crosslinkable groups, and devices incorporating same)
- IT **851745-60-3**
 RL: TEM (Technical or engineered material use); USES (Uses)
 (chromophore; poly(arylene ethers) with pendant crosslinkable groups, and devices incorporating same)
- IT 851770-28-0P, Decafluorobiphenyl-3,5-dihydroxybenzylalcohol-4,4'-(1-phenylethylidene)bisphenol copolymer 4-(trifluorovinyl oxy)benzoate chloride
 RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (poly(arylene ethers) with pendant crosslinkable groups, and devices incorporating same)
- IT 851770-30-4P, 2,2'-Bis(4-hydroxyphenyl) hexafluoropropane-decafluorobiphenyl-3,5-dihydroxybenzylalcohol copolymer 4-(trifluorovinyl oxy)benzoate 851770-32-6P, Bisphenol A-decafluorobiphenyl-3,5-dihydroxybenzylalcohol copolymer 4-(trifluorovinyl oxy)benzoate
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (poly(arylene ethers) with pendant crosslinkable groups, and devices incorporating same)

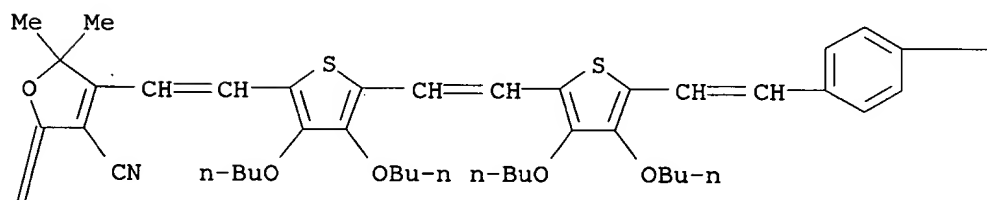
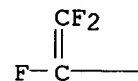
IT 851745-60-3

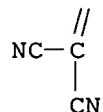
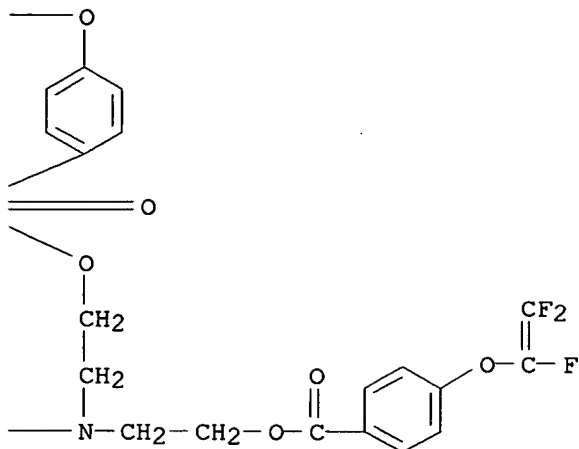
RL: TEM (Technical or engineered material use); USES (Uses)
 (chromophore; poly(arylene ethers) with pendant crosslinkable groups,
 and devices incorporating same)

RN 851745-60-3 CA

CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[2-[3,4-dibutoxy-5-[2-[3,4-dibutoxy-5-[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

PAGE 1-A





L25 ANSWER 5 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 141:304008 CA
 ED Entered STN: 21 Oct 2004
 TI Fluorinated pi-bridge second order **nonlinear optical**
 chromophores and electro-optic devices therefrom
 IN Huang, Diyun
 PA USA
 SO U.S. Pat. Appl. Publ., 20 pp., Cont.-in-part of U.S. Ser. No. 301,978.
 CODEN: USXXCO
 DT Patent
 LA English
 IC ICM C07D049-02
 ICS C07D333-34; G02B005-02; G02C007-10
 INCL 549059000; 549062000; 252582000
 CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related
 Properties)
 Section cross-reference(s): 28

FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004192942	A1	20040930	US 2004-757375	20040114
	US 2002160282	A1	20021031	US 2001-932831	20010817
	US 6716995	B2	20040406		
	US 2003107027	A1	20030612	US 2002-301978	20021122
	US 6750603	B2	20040615		
PRAI	US 2000-226267P	P	20000817		

9/20/2005

US 2001-932831 A2 20010817
 US 2002-301978 A2 20021122

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2004192942	ICM	C07D049-02
	ICS	C07D333-34; G02B005-02; G02C007-10
	INCL	549059000; 549062000; 252582000
US 2004192942	NCL	549/059.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2; G02F001/361F4
US 2002160282	NCL	430/007.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2
US 2003107027	NCL	252/582.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2

OS MARPAT 141:304008

AB **Nonlinear optical** chromophores are described by the general formula D- π -A (π = a π bridge including a thiophene ring having oxygen atoms bonded directly to the 3 and 4 positions of the thiophene ring; D = a donor; A = an acceptor; and the oxygen atoms are further substituted with a fluorinated group comprising ≥ 3 fluorines). Second order **nonlinear optical** compns. comprising a polymer matrix and the chromophores are also described. Electrooptical devices (e.g., optical modulators, optical switches, and optical directional couplers) and (e.g., optically-assisted) phased array radar systems are described which employ the compns.

ST fluorinated pi bridge **nonlinear optical** chromophore electrooptical device

IT Optical couplers

(directional; fluorinated pi-bridge **nonlinear optical** chromophores and compns. and electrooptical devices using them)

IT Electrooptical instruments

Electrooptical materials

Electrooptical modulators

Electrooptical switches

Nonlinear optical materials

(fluorinated pi-bridge **nonlinear optical** chromophores and compns. and electrooptical devices using them)

IT Radar

(phased array; fluorinated pi-bridge **nonlinear optical** chromophores and compns. and electrooptical devices using them)

IT 765317-92-8

RL: DEV (Device component use); USES (Uses)

(fluorinated pi-bridge **nonlinear optical** chromophores and compns. and electrooptical devices using them)

IT 540777-74-OP **540777-78-4P** 540777-80-8P

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(fluorinated pi-bridge **nonlinear optical** chromophores and compns. and electrooptical devices using them)

IT 375-01-9, 2,2,3,3,4,4,4-Heptafluorobutanol 653-34-9,
 2,3,4,5,6-Pentafluorostyrene 1822-66-8 126673-34-5 134151-67-0
 134151-77-2 171082-32-9 392662-56-5 392662-60-1 400760-72-7

RL: RCT (Reactant); RACT (Reactant or reagent)

(fluorinated pi-bridge **nonlinear optical**

chromophores and compns. and electrooptical devices using them)

IT 147212-47-3P 400760-60-3P 540777-72-8P 540777-73-9P 540777-75-1P
 540777-76-2P 540777-77-3P 540777-79-5P 765317-79-1P 765317-81-5P
 765317-82-6P 765317-83-7P 765317-84-8P 765317-85-9P 765317-87-1P
 765317-88-2P 765317-89-3P 765317-90-6P
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT
 (Reactant or reagent)
 (fluorinated pi-bridge **nonlinear optical**
 chromophores and compns. and electrooptical devices using them)

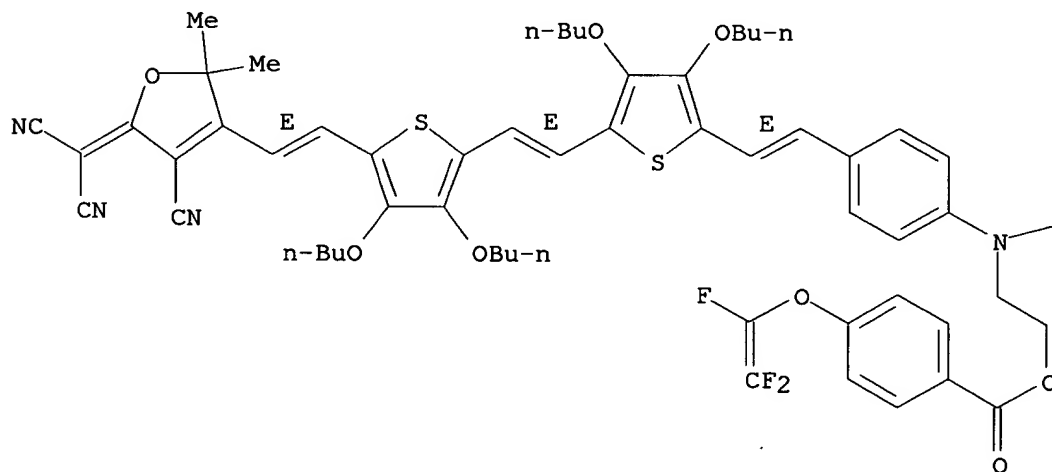
IT 765317-86-0P **765317-91-7P**
 RL: SPN (Synthetic preparation); TEM (Technical or engineered material
 use); PREP (Preparation); USES (Uses)
 (fluorinated pi-bridge **nonlinear optical**
 chromophores and compns. and electrooptical devices using them)

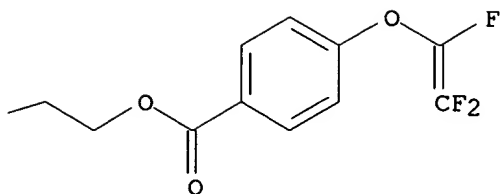
IT **540777-78-4P**
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP
 (Preparation); USES (Uses)
 (fluorinated pi-bridge **nonlinear optical**
 chromophores and compns. and electrooptical devices using them)

RN 540777-78-4 CA
 CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[(1E)-2-[3,4-dibutoxy-5-
 [(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-
 2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-
 thienyl]ethenyl]phenyl]imino]di-2,1-ethanediy ester (9CI) (CA INDEX
 NAME)

Double bond geometry as shown.

PAGE 1-A





IT 765317-91-7P

RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

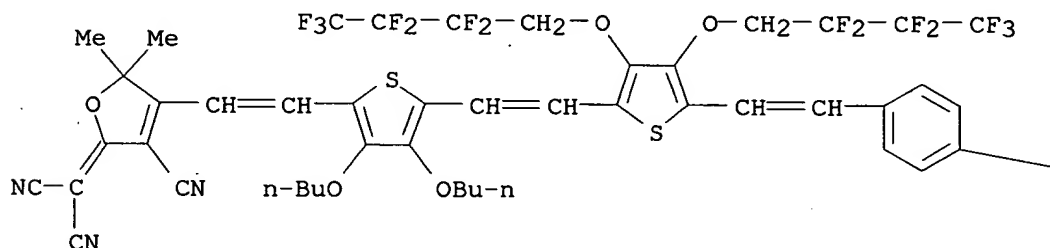
(fluorinated pi-bridge nonlinear optical

chromophores and compns. and electrooptical devices using them)

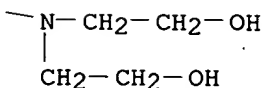
RN 765317-91-7 CA

CN Propanedinitrile, [4-[2-[5-[2-[5-[2-[4-[bis(2-hydroxyethyl)amino]phenyl)ethenyl]-3,4-bis(2,2,3,3,4,4,4-heptafluorobutoxy)-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlylidene]- (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B



L25 ANSWER 6 OF 28 CA COPYRIGHT 2005 ACS on STN

AN 141:181611 CA

ED Entered STN: 02 Sep 2004

TI Reversible crosslinking method for making an electro-optic polymer

IN Jen, Kwan-yue; Dalton, Larry R.; Luo, Jingdong; Haller, Marnie

9/20/2005

09/912,444

PA University of Washington, USA

SO PCT Int. Appl., 27 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM C12Q

CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 35

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2004065615	A2	20040805	WO 2004-US1043	20040115
	WO 2004065615	A3	20040930		
	W:	AE, AE, AG, AL, AL, AM, AM, AM, AT, AT, AU, AZ, AZ, BA, BB, BG, BG, BR, BR, BW, BY, BY, BZ, BZ, CA, CH, CN, CN, CO, CO, CR, CR, CU, CU, CZ, CZ, DE, DE, DK, DK, DM, DZ, EC, EC, EE, EE, EG, ES, ES, FI, FI, GB, GD, GE, GE, GH, GM, HR, HR, HU, HU, ID, IL, IN, IS, JP, JP, KE, KE, KG, KG, KP, KP, KP, KR, KR, KZ, KZ, LC, LK, LR, LS, LS, LT, LU, LV, MA, MD, MD, MG, MK, MN, MW, MX, MX, MZ, MZ, NA, NI			
	US 2004266954	A1	20041230	US 2004-758292	20040115
PRAI	US 2003-440971P	P	20030115		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2004065615	ICM	C12Q
US 2004266954	NCL	525/326.100

AB Crosslinkable polymers which comprise ≥ 1 polarizable chromophore moieties; ≥ 1 diene moieties; and ≥ 1 dienophile or dienophile precursor moieties are described in which the diene and dienophile moieties are reactive to form 4+2 cycloaddn. products. Crosslinked polymers comprising aligned polarizable chromophore moieties; and ≥ 1 4+2 cycloaddn. moieties are also described in which the 4+2 cycloaddn. moieties are reversibly thermally reactive to provide diene moieties and dienophile moieties. Methods for making a crosslinked polymer having electrooptical activity, are described which entail heating the crosslinkable polymer to form a softened polymer, subjecting the softened polymer to an elec. field to provide a poled polymer having aligned polarizable chromophore moieties; and cooling the poled polymer to a temperature sufficient to provide a hardened crosslinked polymer having electrooptical activity. The materials may incorporate **nonlinear optical** chromophores.

ST crosslinkable polymer polarizable chromophore moiety electrooptical activity; **nonlinear optical** polarizable chromophore moiety crosslinkable polymer

IT Crosslinking

Electrooptical materials

Nonlinear optical materials

(crosslinkable polymers with polarizable chromophore moieties and the production of crosslinked polymers having electrooptical activity)

IT Polymers, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(crosslinkable polymers with polarizable chromophore moieties and the production of crosslinked polymers having electrooptical activity)

IT 24979-70-2DP, Poly(4-vinylphenol), reaction products with dienes and dienophiles and chromophores 105578-55-ODP, reaction products with polyvinylphenol 502558-67-ODP, reaction products with

9/20/2005

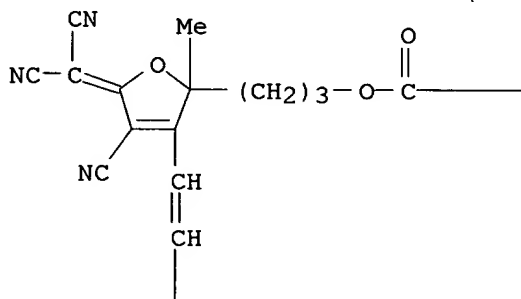
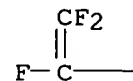
polyvinylphenol 637025-84-4DP, reaction products with polyvinylphenol
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP
 (Preparation); USES (Uses)
 (crosslinkable polymers with polarizable chromophore moieties and the
 production of crosslinked polymers having electrooptical activity)

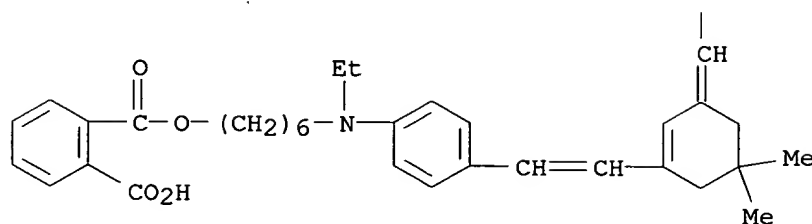
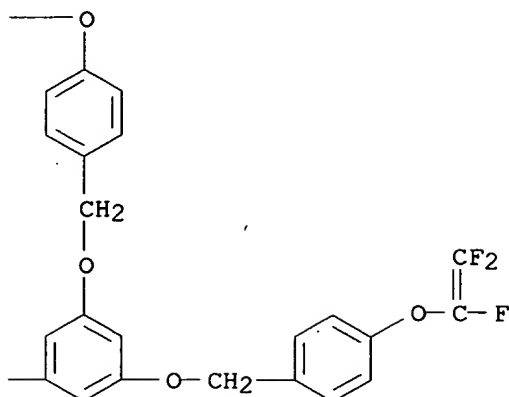
IT **502558-67-0DP**, reaction products with polyvinylphenol
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP
 (Preparation); USES (Uses)
 (crosslinkable polymers with polarizable chromophore moieties and the
 production of crosslinked polymers having electrooptical activity)

RN 502558-67-0 CA

CN 1,2-Benzenedicarboxylic acid, mono[6-[[4-[2-[3-[3-[2-[3-[[3,5-bis[[4-
 [(trifluoroethenyl)oxy]phenyl]methoxy]benzoyl]oxy]propyl]-4-cyano-5-
 (dicyanomethylene)-2,5-dihydro-2-methyl-3-furanyl]-2-propenylidene]-5,5-
 dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]ethylamino]hexyl] ester (9CI)
 (CA INDEX NAME)

PAGE 1-A





L25 ANSWER 7 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 141:174069 CA
 ED Entered STN: 02 Sep 2004
 TI Preparation of 2,5-dihydrofuran-linked thiophene derivatives having
 conjugated double bonds as **nonlinear optical** compounds
 and methods for their preparation
 IN Jen, Kwan-yue; Ma, Hong; Liu, Sen; Dalton, Larry R.
 PA University of Washington, USA
 SO PCT Int. Appl., 69 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM C07D409-00
 ICS C07D333-32; C07D333-02; C07D333-38; C07D307-02
 CC 27-8 (Heterocyclic Compounds (One Hetero Atom))
 Section cross-reference(s): 73
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2004065384	A1	20040805	WO 2003-US1393	20030115
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH,				

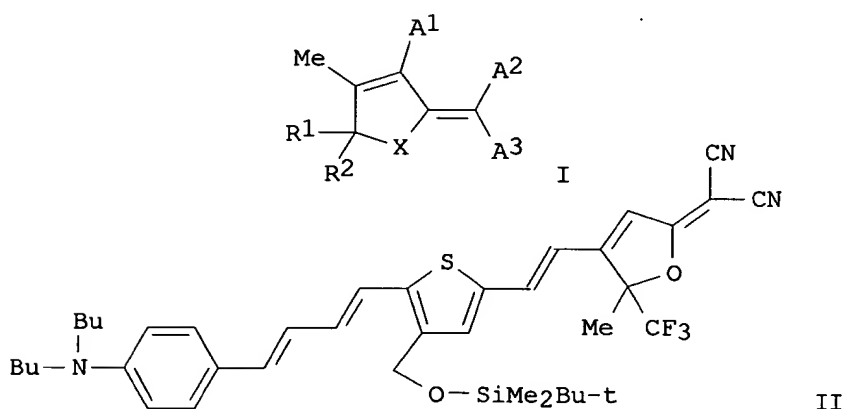
PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ,
 UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
 RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY,
 KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES,
 FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR, BF,
 BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRAI WO 2003-US1393

20030115

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2004065384	ICM	C07D409-00
	ICS	C07D333-32; C07D333-02; C07D333-38; C07D307-02
OS MARPAT 141:174069		
GI		



AB Nonlinear optically active compds. having a π -donor moiety covalently coupled to a π -acceptor moiety through a π -electron conjugated bridge moiety are prepared by irradiating with microwave irradiation a combination of a π -acceptor compound (I; R1 is at least one of alkyl, aryl, or heteroalkyl group; R2 is at least one of alkyl, aryl, or heteroalkyl group; A1 is at least one of alkyl, aryl, or any electron withdrawing group; A2 is an electron withdrawing group; A3 is an electron withdrawing group; X is at least one of O, S, or CH2) and a compound having a π -donor moiety covalently coupled to a π -electron conjugated bridge moiety. Also disclosed are macrostructures that include nonlinear optically active components, and devices including the nonlinear optically active compds. and the macrostructures. Thus, a mixture of N,N-dibutyl-4-[(1E,3E)-4-(3-tert-butyldimethylsiloxy-5-formylthien-2-yl)-1,3-butadienyl]aniline (102 mg, 0.2 mmol) and 2-dicyanomethylene-3-cyano-4,5-dimethyl-5-trifluoromethyl-2,5-dihydrofuran (51 mg, 0.2 mmol) in 1 mL ethanol was irradiated under focused microwave 20 W for 8 min and the resulting mixture was concentrated and purified through a flash chromatog. on silica gel with a gradient eluent of hexanes/ethyl acetate (20/1-9/1) to give 85 mg of product (II) as dark solid (57 %). A solution of 26 weight% II/poly(Me methacrylate) (guest/host polymer) in cyclopentanone was spin-coated onto half-etched ITO glass substrate to give a film (1.2 μ m thickness) with good optical quality which was hard-baked under vacuum at 65° for >12 h to remove residual solvent. A thin layer of gold was

sputtered on to the film as the top electrode to perform the high elec. field poling. After poling at 140° with 1 MV/cm for 5 min, an electrooptical coefficient of 116 pm/V was obtained at 1.3 μm and retained over 85% of its original value up to 480 h when the stability of the electrooptical signal was monitored at 85° under vacuum.

ST conjugated dihydrofuran linked thiophene prepn **nonlinear optical** material

IT Electrooptical modulators

Electrooptical switches

Nonlinear optical materials

(preparation of 2,5-dihydrofuran-linked thiophene derivs. having conjugated double bonds as **nonlinear optical** materials)

IT 498-62-4P, 3-Thiophenecarboxaldehyde 636-72-6P, 2-Thiophenemethanol
765-50-4P, 2-Chloromethylthiophene 2026-42-8P, Diethyl
[(thien-2-yl)methyl]phosphonate 53358-54-6P, N,N-Dibutyl-4-bromoaniline
70260-16-1P, 2-Bromo-3-hydroxymethylthiophene 71637-34-8P,
3-(Hydroxymethyl)thiophene 90134-11-5P, 3-[4-(Dibutylamino)henyl]crolein
364599-35-9P, 2-Imino-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran
369609-49-4P, 2-(Dicyanomethylene)-3-cyano-4,5-dimethyl-5-
trifluoromethyl-2,5-dihydrofuran 613237-31-3P, 2-(1-Ethoxycarbonyl-1-
cyanomethylene)-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran 613237-32-4P,
2-(1-Cyano-1-nitromethylene)-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran
613237-33-5P 613237-34-6P, 2-Imino-3-(2-pyridyl)-4,5,5-trimethyl-2,5-
dihydrofuran 613237-35-7P, 2-(Dicyanomethylene)-3-(2-pyridyl)-4,5,5-
trimethyl-2,5-dihydrofuran 613237-37-9P, N,N-Dibutyl-4-[(1E,3E)-4-(5-
formylthien-2-yl)-1,3-butadienyl]aniline 721969-05-7P,
2-Bromo-3-(tert-butyldimethylsiloxyethyl)thiophene 721969-06-8P,
Diethyl [[3-(tert-butyldimethylsiloxyethyl)thien-2-yl]methyl]phosphate
733808-62-3P, N,N-Dibutyl-4-[(1E,3E)-4-(thien-2-yl)-1,3-butadienyl]aniline
733808-63-4P, N,N-Dibutyl-4-[(1E,3E)-4-(3-tert-butyldimethylsiloxy-5-
formylthien-2-yl)-1,3-butadienyl]aniline 733808-64-5P,
N,N-Dibutyl-4-[(1E,3E)-4-(3-tert-butyldimethylsiloxythien-2-yl)-1,3-
butadienyl]aniline

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(intermediate; preparation of 2,5-dihydrofuran-linked thiophene derivs. having conjugated double bonds as **nonlinear optical** materials)

IT **613237-39-1P 613237-40-4P** 733808-66-7P

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

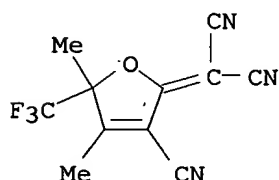
(preparation of 2,5-dihydrofuran-linked thiophene derivs. having conjugated double bonds as **nonlinear optical** materials)

IT 78-40-0, Triethyl phosphate 98-03-3, 2-Thiophenecarboxaldehyde
105-56-6, Ethyl cyanoacetate 109-77-3, Malononitrile 115-22-0,
3-Hydroxy-3-methylbutan-2-one 613-29-6, N,N-Dibutylaniline 872-31-1,
3-Bromothiophene 927-63-9, 3-(Dimethylamino)acrolein 2739-97-1,
2-Pyridylacetonitrile 5217-47-0, 1,3-Diethyl-2-thiobarbituric acid
10419-77-9, Diethyl iodomethylphosphonate 13218-13-8, Nitroacetonitrile
18162-48-6, tert-Butyldimethylsilyl chloride 240807-13-0, Diethyl
iodomethylphosphate

RL: RCT (Reactant); RACT (Reactant or reagent)

(reactant; preparation of 2,5-dihydrofuran-linked thiophene derivs. having conjugated double bonds as **nonlinear optical** materials)

RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE



IT 613237-39-1P 613237-40-4P
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(preparation of 2,5-dihydrofuran-linked thiophene derivs. having conjugated double bonds as **nonlinear optical** materials)

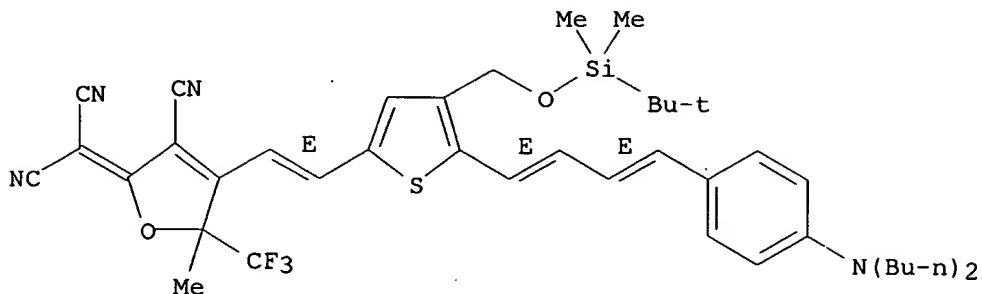
RN 613237-39-1 CA

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

CN(C)Cc1ccc(cc1)/C=C/C=C/C=C/c2ccsc2/C=C/c3c(C(F)(F)F)c4oc(C#N)c(C#N)c43

RN 613237-40-4 CA
CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

9/20/2005



- L25 ANSWER 8 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 141:140868 CA
 ED Entered STN: 19 Aug 2004
 TI Nanoscale Architectural Control and Macromolecular Engineering of
Nonlinear Optical Dendrimers and Polymers for
 Electro-Optics
 AU Luo, Jingdong; Haller, Marnie; Ma, Hong; Liu, Sen; Kim, Tae-Dong; Tian,
 Yanqing; Chen, Baoquan; Jang, Sei-Hum; Dalton, Larry R.; Jen, Alex K-Y.
 CS Department of Materials Science & Engineering, University of Washington,
 Seattle, WA, 98195, USA
 SO Journal of Physical Chemistry B (2004), 108(25), 8523-8530
 CODEN: JPCBFK; ISSN: 1520-6106
 PB American Chemical Society
 DT Journal
 LA English
 CC 35-7 (Chemistry of Synthetic High Polymers)
 Section cross-reference(s): 36, 73
 AB Nanoscale architectural control during preparation was used to tailor the size,
 shape, conformation, and functionality of Ph tetracyanobutadienyl
 thiophene stilbene **NLO** chromophores and macromols. and their
 effects on poling efficiency were studied. The structure of these
 materials varies from a 3-D-shaped dendritic chromophore, multifunctional
 dendrimers with the center core connected to **NLO** chromophores,
 and cross-linkable functional groups at the periphery, to
 side-chain-dendronized **NLO** polymers. All the poling results
 from these systems show dramatically enhanced electro-optic (EO)
 properties (a factor of 2-3) compared to conventional **NLO**
 polymers.
 ST phenyl tetracyanobutadienyl thiophene stilbene dendrimer prepn **NLO**
 property; electrooptic response dendrimer functional group poling
 efficiency
 IT Polymer chains
 (conformation; preparation of phenyl-cyanobutadienylthiophene-stilbene
 dendrons and of poly(vinyl alc.) side chain dendronized polymers and
NLO electrooptic response of cylindrical shape dendrimers)
 IT Electrooptical effect
 (poling; preparation of phenyl-cyanobutadienylthiophene-stilbene dendrons
 and of poly(vinyl alc.) side chain dendronized polymers and **NLO**
 electrooptic response of cylindrical shape dendrimers)
 IT **Nonlinear optical** materials
 (preparation of phenyl-cyanobutadienylthiophene-stilbene dendrons and of
 poly(vinyl alc.) side chain dendronized polymers and **NLO**
 electrooptic response of cylindrical shape dendrimers)
 IT Dendritic polymers

- RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
(preparation of phenyl-cyanobutadienylthiophene-stilbene dendrons and of poly(vinyl alc.) side chain dendronized polymers and **NLO** electrooptic response of cylindrical shape dendrimers)
- IT 134151-66-9P, 4-Trifluorovinylxybenzoic acid
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(intermediate; preparation of phenyl-cyanobutadienylthiophene-stilbene dendrons and of poly(vinyl alc.) side chain dendronized polymers and **NLO** electrooptic response of cylindrical shape dendrimers)
- IT 108-30-5, Succinic anhydride, reactions 124-38-9, Carbon dioxide, reactions 2857-97-8, Bromotrimethylsilane 134151-77-2, 1-Bromo-4-trifluorovinylxybenzene 143330-91-0, 3,5-Dihydroxybenzoic acid 2,2,2-trichloroethyl ester 224784-28-5 717923-47-2 717923-48-3, 4-[(Trifluoroethenyl)oxy]benzyl alcohol
RL: RCT (Reactant); RACT (Reactant or reagent)
(preparation of phenyl-cyanobutadienylthiophene-stilbene dendrons and of poly(vinyl alc.) side chain dendronized polymers and **NLO** electrooptic response of cylindrical shape dendrimers)
- IT 717923-49-4P 724771-20-4P 724771-22-6P **724771-27-1P**
724771-29-3P 724771-31-7P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(preparation of phenyl-cyanobutadienylthiophene-stilbene dendrons and of poly(vinyl alc.) side chain dendronized polymers and **NLO** electrooptic response of cylindrical shape dendrimers)
- IT 538-75-0, 1,3-Dicyclohexylcarbodiimide 91944-64-8, 4-(Dimethylamino)-pyridinium 4-toluenesulfonate
RL: RGT (Reagent); RACT (Reactant or reagent)
(preparation of phenyl-cyanobutadienylthiophene-stilbene dendrons and of poly(vinyl alc.) side chain dendronized polymers and **NLO** electrooptic response of cylindrical shape dendrimers)
- IT 502449-11-8P
RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of phenyl-cyanobutadienylthiophene-stilbene dendrons and of poly(vinyl alc.) side chain dendronized polymers and **NLO** electrooptic response of cylindrical shape dendrimers)
- IT **727722-17-0P**
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
(side-chain dendronized polymers of cylindrical shape; preparation of phenyl-cyanobutadienylthiophene-stilbene dendrons and of poly(vinyl alc.) side chain dendronized polymers and **NLO** electrooptic response of cylindrical shape dendrimers)

RE.CNT 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

- (1) Burland, D; Chem Rev 1994, V94, P31 CA
- (2) Dalton, L; J Mater Chem 1999, V9, P19
- (3) Frey, H; Angew Chem, Int Ed 1998, V37, P2193 CA
- (4) Grayson, S; Chem Rev 2001, V101, P3819 CA
- (5) Hecht, S; Angew Chem, Int Ed 2001, V40, P74 CA
- (6) Kajzar, F; Adv Polym Sci 2003, V161, P1 CA
- (7) Lee, M; Science 2002, V298, P1401 CA
- (8) Luo, J; Adv Mater 2002, V14, P1763 CA
- (9) Luo, J; Chem Commun 2002, P888 CA
- (10) Luo, J; Macromolecules 2004, V37, P248 CA
- (11) Ma, H; Adv Funct Mater 2002, V12, P565 CA
- (12) Ma, H; Adv Mater 2001, V13, P1201 CA
- (13) Ma, H; J Am Chem Soc 2001, V123, P986 CA

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

RN 724771-27-1 CA

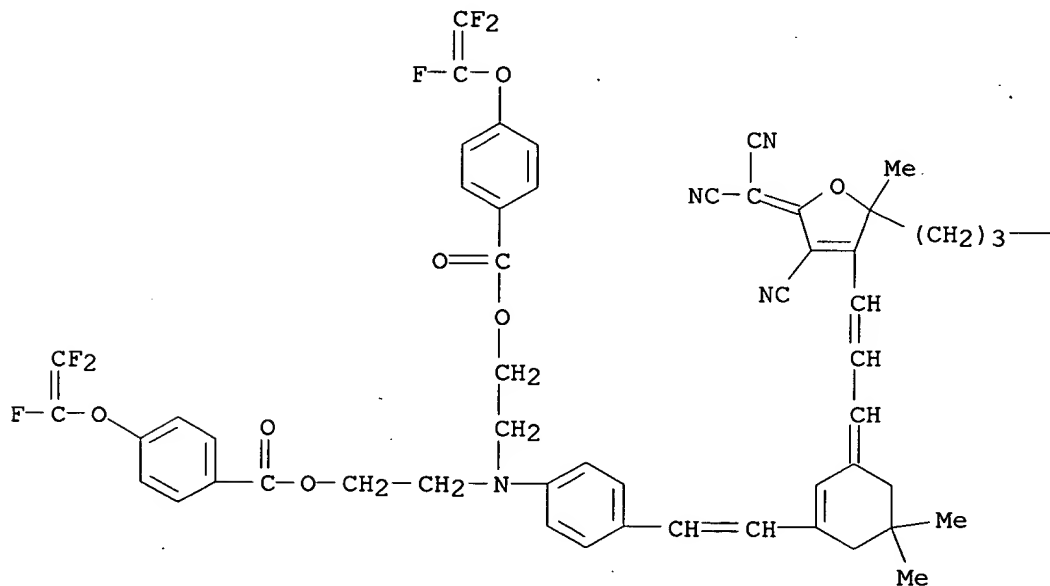
CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[2-[3-[3-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-[3-(methoxymethoxy)propyl]-2-methyl-3-furanyl]-2-propenylidene]-5,5-dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

CC1=C(C)C(=C/C=C/C2=CC=CC=C2N(CCCOC(=O)C3=CC=CC=C3C(F)=C(F)F)C(=O)C4=CC=CC=C4OC(F)=C(F)F)C=C/C5=CC=CC=C5C(C)=C(C#N)C5#N

—O—CH₂—OMe

RN 724771-29-3 CA

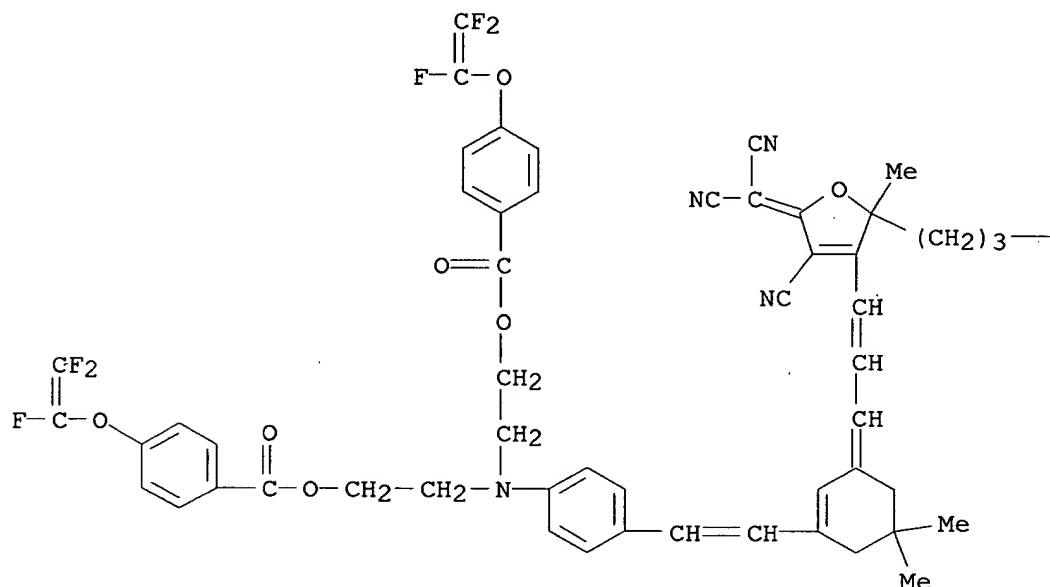
CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[2-[3-[3-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-(3-hydroxypropyl)-2-methyl-3-furanyl]-2-propenylidene]-5,5-dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)



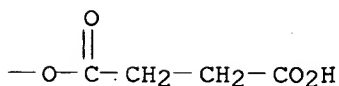
—OH

RN 724771-31-7 CA
 CN Butanedioic acid, mono[3-[3-[3-[3-[2-[4-[bis[2-[4-
 [(trifluoroethenyl)oxy]benzoyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-
 dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-4-cyano-5-(dicyanomethylene)-
 2,5-dihydro-2-methyl-2-furanyl]propyl] ester (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B



IT **727722-17-0P**
 RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
 (side-chain dendronized polymers of cylindrical shape; preparation of
 phenyl-cyanobutadienylthiophene-stilbene dendrons and of poly(vinyl
 alc.) side chain dendronized polymers and **NLO** electrooptic
 response of cylindrical shape dendrimers)

RN 727722-17-0 CA
 CN Phenol, 4-ethenyl-, homopolymer, 3-[3-[3-[3-[2-[4-[bis[2-[4-
 [(trifluoroethenyl)oxy]benzoyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-
 dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-4-cyano-5-(dicyanomethylene)-
 2,5-dihydro-2-methyl-2-furanyl]propyl butanedioate 3,5-bis[4-

09/912,444

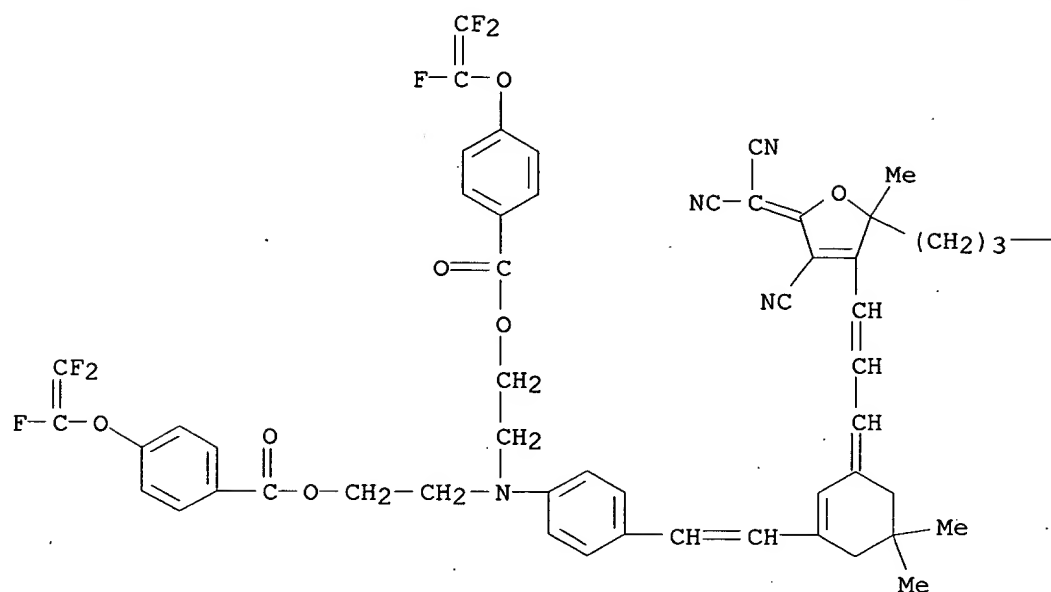
[(trifluoroethenyl)oxy]phenyl]methoxy]benzoate (9CI) (CA INDEX NAME)

CM 1

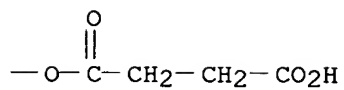
CRN 724771-31-7

CMF C57 H50 F6 N4 O11

PAGE 1-A



PAGE 1-B

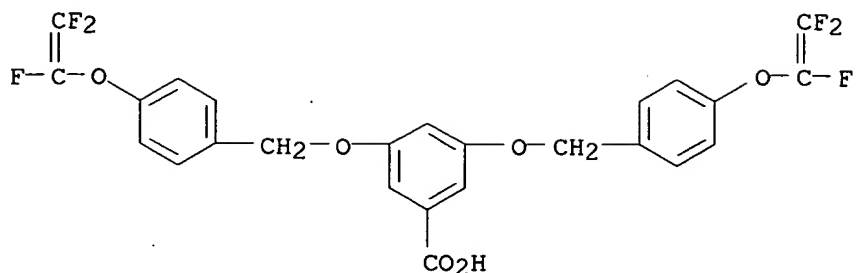


CM 2

CRN 502449-11-8

CMF C25 H16 F6 O6

9/20/2005



CM 3

CRN 24979-70-2

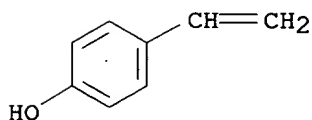
CMF (C8 H8 O)x

CCI PMS

CM 4

CRN 2628-17-3

CMF C8 H8 O



L25 ANSWER 9 OF 28 CA COPYRIGHT 2005 ACS on STN

AN 141:130999 CA

ED Entered STN: 12 Aug 2004

TI **Nonlinear optical** compounds and methods for their preparation

IN Jen, Kwan-Yue; Ma, Hong; Liu, Sen; Dalton, Larry R.

PA University of Washington, USA

SO U.S. Pat. Appl. Publ., 39 pp.

CODEN: USXXCO

DT Patent

LA English

IC ICM G03B011-00

ICS G02B005-02

INCL 252582000; 204157150

CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 27

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004135130	A1	20040715	US 2003-347117	20030115
	US 2005023507	A1	20050203	US 2004-934964	20040903
PRAI	US 2003-347117	A3	20030115		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
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US 2004135130 ICM G03B011-00
ICS G02B005-02
INCL 252582000; 204157150

US 2004135130 NCL 252/582.000

US 2005023507 NCL 252/582.000

OS MARPAT 141:130999

AB Nonlinear optically active compds., methods for making nonlinear optically active compds., compds. useful for making nonlinear optically active compds., methods for making compds. useful for making nonlinear optically active compds., macrostructures that include nonlinear optically active components, and devices including the nonlinear optically active compds. and the macrostructures.

ST **NLO** property electrooptical aniline donor thiophene bridge tricyanodihydrofuran acceptor

IT Electrooptical effect
Electrooptical materials
Glass substrates
Nonlinear optical properties
(preparation and electrooptical properties of compds. with aniline moiety donor, tricyanodihydrofuran acceptor and thiophene bridge)

IT 7440-57-5, Gold, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(electrode; preparation and electrooptical properties of compds. with aniline moiety donor, tricyanodihydrofuran acceptor and thiophene bridge)

IT 9011-14-7, Polymethylmethacrylate 50926-11-9, ITO
RL: DEV (Device component use); USES (Uses)
(preparation and electrooptical properties of compds. with aniline moiety donor, tricyanodihydrofuran acceptor and thiophene bridge)

IT **721969-04-6P 721969-10-4P**
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(preparation and electrooptical properties of compds. with aniline moiety donor, tricyanodihydrofuran acceptor and thiophene bridge)

IT 498-62-4P, 3-Thiophenecarboxaldehyde 636-72-6P, 2-Thiophenemethanol 765-50-4P 2026-42-8P 53358-54-6P, 4-Bromo-n,N-dibutylaniline 70260-16-1P, 3-Thiophenemethanol, 2-bromo- 71637-34-8P, 3-(Hydroxymethyl)thiophene 90134-11-5P 364599-35-9P
369609-49-4P 613237-31-3P 613237-32-4P 613237-33-5P
613237-34-6P 613237-35-7P 721969-02-4P 721969-03-5P 721969-05-7P
721969-06-8P 721969-07-9P 721969-08-0P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(preparation and electrooptical properties of compds. with aniline moiety donor, tricyanodihydrofuran acceptor and thiophene bridge)

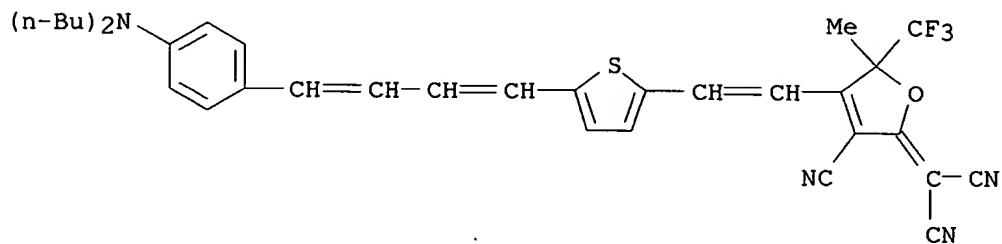
IT 721969-12-6P
RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(preparation and electrooptical properties of compds. with aniline moiety donor, tricyanodihydrofuran acceptor and thiophene bridge)

IT **721969-04-6P 721969-10-4P**
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(preparation and electrooptical properties of compds. with aniline moiety donor, tricyanodihydrofuran acceptor and thiophene bridge)

RN 721969-04-6 CA

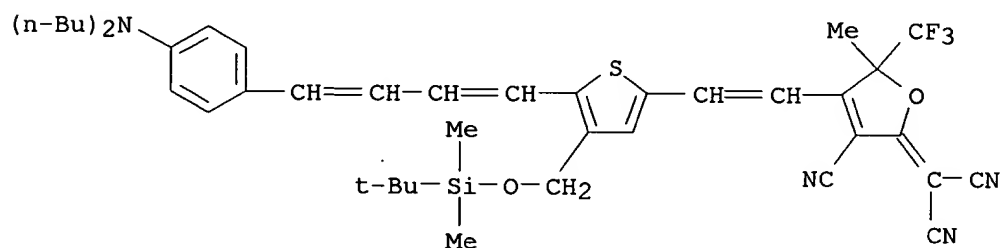
09/912,444

CN Propanedinitrile, [3-cyano-4-[2-[5-[4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



RN 721969-10-4 CA

CN Propanedinitrile, [3-cyano-4-[2-[5-[4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



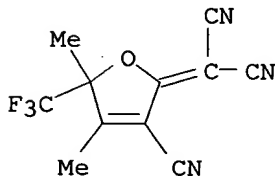
IT 369609-49-4P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(preparation and electrooptical properties of compds. with aniline moiety donor, tricyanodihydrofuran acceptor and thiophene bridge)

RN 369609-49-4 CA

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(trifluoromethyl)-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



L25 ANSWER 10 OF 28 CA COPYRIGHT 2005 ACS on STN

AN 141:106890 CA

ED Entered STN: 05 Aug 2004

TI Polymers having pendant **nonlinear optical** chromophores and electro-optic devices made from them

IN Huang, Diyun; Chen, Baoquan

PA USA

SO U.S. Pat. Appl. Publ., 23 pp., Cont.-in-part of U.S. Ser. No. 395,610. CODEN: USXXCO

9/20/2005

09/912,444

DT Patent
LA English
IC ICM C08G075-00
ICS C07D049-02
INCL 528377000; 549059000
CC 35-7 (Chemistry of Synthetic High Polymers)
Section cross-reference(s): 73

FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004132960	A1	20040708	US 2003-625371	20030723
	US 2002160282	A1	20021031	US 2001-932831	20010817
	US 6716995	B2	20040406		
	US 2003107027	A1	20030612	US 2002-301978	20021122
	US 6750603	B2	20040615		
	US 2003183812	A1	20031002	US 2003-395610	20030324
	CA 2505881	AA	20040610	CA 2003-2505881	20031119
	WO 2004048927	A2	20040610	WO 2003-US37180	20031119
	WO 2004048927	A3	20050707		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW			
	RW:	BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	EP 1573391	A2	20050914	EP 2003-789898	20031119
	R:	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK			
PRAI	US 2000-226267P	P	20000817		
	US 2001-932831	A2	20010817		
	US 2002-301978	A1	20021122		
	US 2003-395610	A2	20030324		
	US 2003-625371	A	20030723		
	WO 2003-US37180	W	20031119		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2004132960	ICM	C08G075-00
	ICS	C07D049-02
	INCL	528377000; 549059000
US 2004132960	NCL	528/377.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2; G02F001/361F4
US 2002160282	NCL	430/007.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2
US 2003107027	NCL	252/582.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2
US 2003183812	NCL	252/583.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2; G02F001/361F4
WO 2004048927	ECLA	G02F001/361D2; G02F001/361F4

AB The invention relates to a **nonlinear optical**

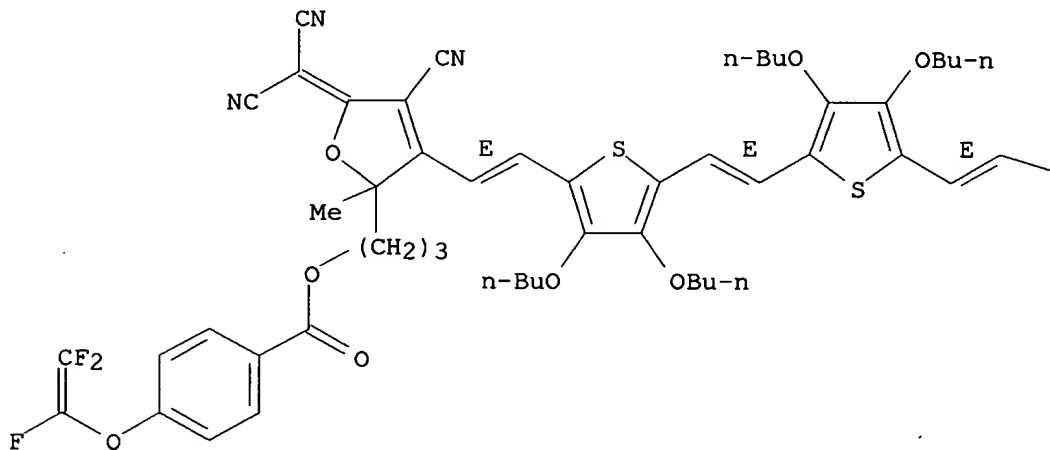
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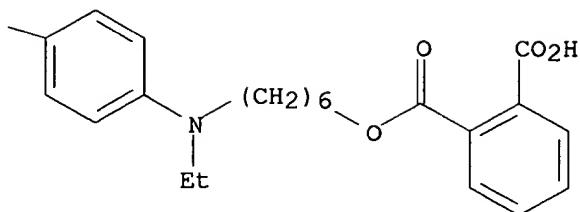
- chromophore having the formula D- π -A, wherein π is a π bridge including a thiophene ring having oxygen atoms bonded directly to the 3 and 4 positions of the thiophene ring, D is a donor, and A is an acceptor, and compns. that include a linear polymer and the chromophore as a pendant group.
- ST optoelectronic device manuf **nonlinear optical**
chromophore polymer; thiophene substituted chromophore polymer
optoelectronic device manuf
- IT Chromophores
(manufacture of polymers having pendant **nonlinear optical**
chromophores and electro-optic devices made from them)
- IT Optoelectronics
Waveguides
(polymers having pendant **nonlinear optical**
chromophores and electro-optic devices made from them)
- IT Fluoropolymers, preparation
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polymers having pendant **nonlinear optical**
chromophores and electro-optic devices made from them)
- IT 132721-26-7, Bisphenol A; carbonic acid; 4,4'-(3,3,5-trimethylcyclohexylidene)diphenol copolymer
RL: POF (Polymer in formulation); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(assumed monomers; polymers having pendant **nonlinear optical** chromophores and electro-optic devices made from them)
- IT 540777-74-0P
RL: IMF (Industrial manufacture); MOA (Modifier or additive use); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(chromophores; polymers having pendant **nonlinear optical** chromophores and electro-optic devices made from them)
- IT 126673-34-5, 3,4-Dibutoxythiophene
RL: RCT (Reactant); RACT (Reactant or reagent)
(manufacture of polymers having pendant **nonlinear optical** chromophores and electro-optic devices made from them)
- IT **718636-99-8P 718637-00-4P**
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polymers having pendant **nonlinear optical** chromophores and electro-optic devices made from them)
- IT 134151-76-1P 143330-91-0P, (2,2,2-Trichloroethyl) 3,5-dihydroxybenzoate
147212-47-3P 273940-68-4P 273940-69-5P 273940-70-8P 400760-60-3P
540777-72-8P 540777-73-9P 540777-75-1P 540777-76-2P 540777-77-3P
540777-78-4P 540777-79-5P 701235-41-8P 701235-43-0P
701235-45-2P 701235-51-0P **701235-53-2P 701235-55-4P**
701235-57-6P 701235-59-8P 701235-61-2P
701235-63-4P 717923-43-8P 717923-44-9P 717923-45-0P
717923-46-1P 717923-47-2P 717923-48-3P 717923-49-4P
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(polymers having pendant **nonlinear optical** chromophores and electro-optic devices made from them)
- IT 540777-80-8P
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polymers having pendant **nonlinear optical** chromophores and electro-optic devices made from them)
- IT 68-12-2, DMF, reactions 85-44-9, Phthalic anhydride 99-10-5,

3,5-Dihydroxybenzoic acid 108-24-7, Acetic anhydride 109-92-2, Ethyl vinyl ether 115-20-8, 2,2,2-Trichloroethanol 653-34-9, 2,3,4,5,6-Pentafluorostyrene 1071-73-4, 3-Acetyl-1-propanol 6399-81-1, Triphenylphosphine hydrobromide 7087-68-5, Diisopropylethylamine 18162-48-6, TBDMS-Cl 134151-67-0 134151-77-2 156780-48-2 171082-32-9 392662-56-5 392662-60-1 502449-11-8 701235-49-6
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (polymers having pendant **nonlinear optical** chromophores and electro-optic devices made from them)
 IT 16940-66-2, Sodium borohydride (NaBH₄)
 RL: RGT (Reagent); RACT (Reactant or reagent)
 (reducing agent; polymers having pendant **nonlinear optical** chromophores and electro-optic devices made from them)
 IT 718636-99-8P 718637-00-4P
 RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (polymers having pendant **nonlinear optical** chromophores and electro-optic devices made from them)
 RN 718636-99-8 CA
 CN Phenol, 4-ethenyl-, homopolymer, 6-[[4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-2-[3-[[4-[(trifluoroethenyl)oxy]benzoyl]oxy]propyl]-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]ethylamino]hexyl 1,2-benzenedicarboxylate 4-[(trifluoroethenyl)oxy]benzoate (9CI) (CA INDEX NAME)
 CM 1.
 CRN 701235-61-2
 CMF C73 H81 F3 N4 O12 S2

Double bond geometry as shown.

PAGE 1-A

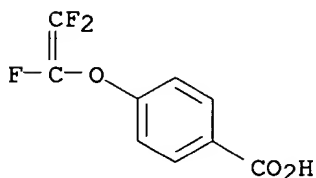




CM 2

CRN 134151-66-9

CMF C9 H5 F3 O3



CM 3

CRN 24979-70-2

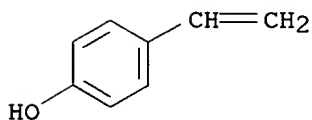
CMF (C8 H8 O) x

CCI PMS

CM 4

CRN 2628-17-3

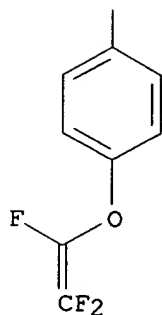
CMF C8 H8 O



RN 718637-00-4 CA

CN Phenol, 4-ethenyl-, homopolymer, 6-[[4-[(1E)-2-[5-[(1E)-2-[5-[(1E)-2-[2-[3-[[3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]benzoyl]oxy]propyl]-4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-3-furanyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]phenyl]ethylamino]hexyl 1,2-benzenedicarboxylate 4-[(trifluoroethenyl)oxy]benzoate (9CI) (CA INDEX NAME)

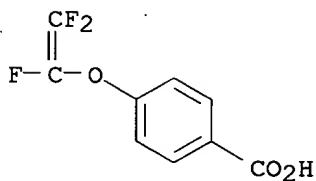
CM 1



CM 2

CRN 134151-66-9

CMF C9 H5 F3 O3



CM 3

CRN 24979-70-2

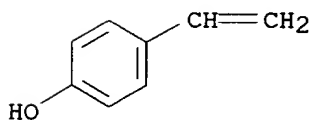
CMF (C8 H8 O) x

CCI PMS

CM 4

CRN 2628-17-3

CMF C8 H8 O



IT 540777-78-4P 701235-53-2P 701235-55-4P
 701235-57-6P 701235-59-8P 701235-61-2P
 701235-63-4P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT
 (Reactant or reagent)

(polymers having pendant **nonlinear optical**
 chromophores and electro-optic devices made from them)

RN 540777-78-4 CA

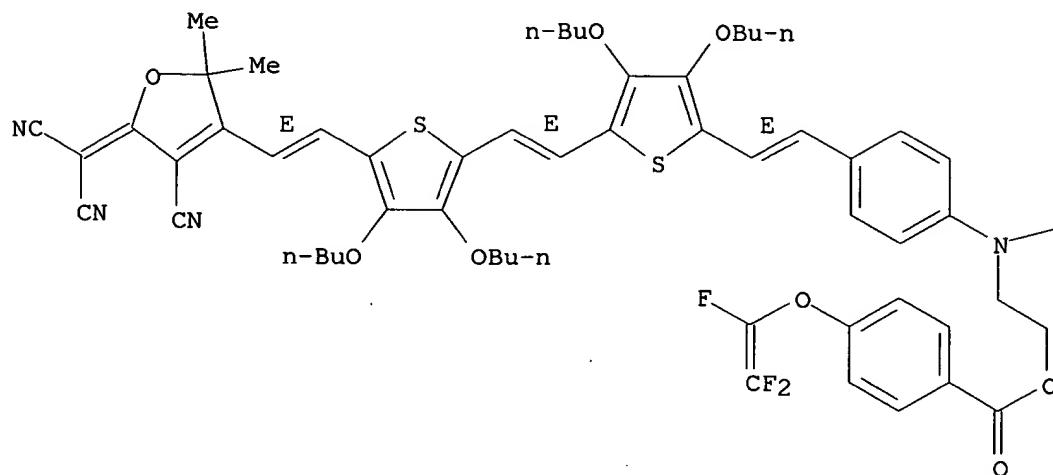
CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[(1E)-2-[3,4-dibutoxy-5-
 [(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-
 2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-

09/912,444

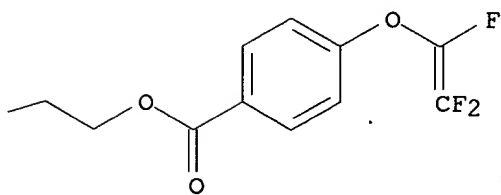
thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B

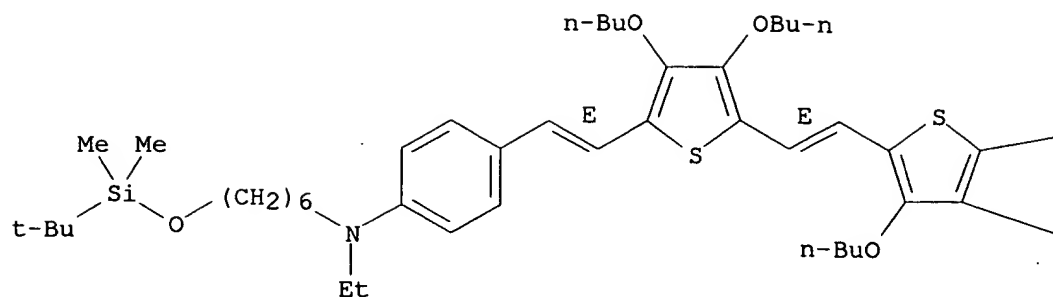


RN 701235-53-2 CA
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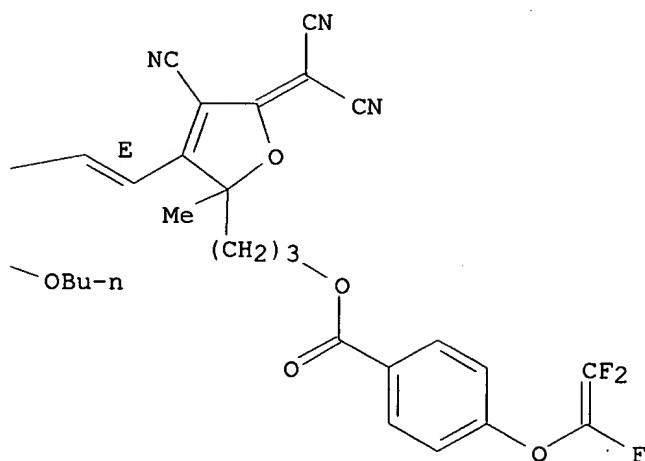
Double bond geometry as shown.

9/20/2005

PAGE 1-A



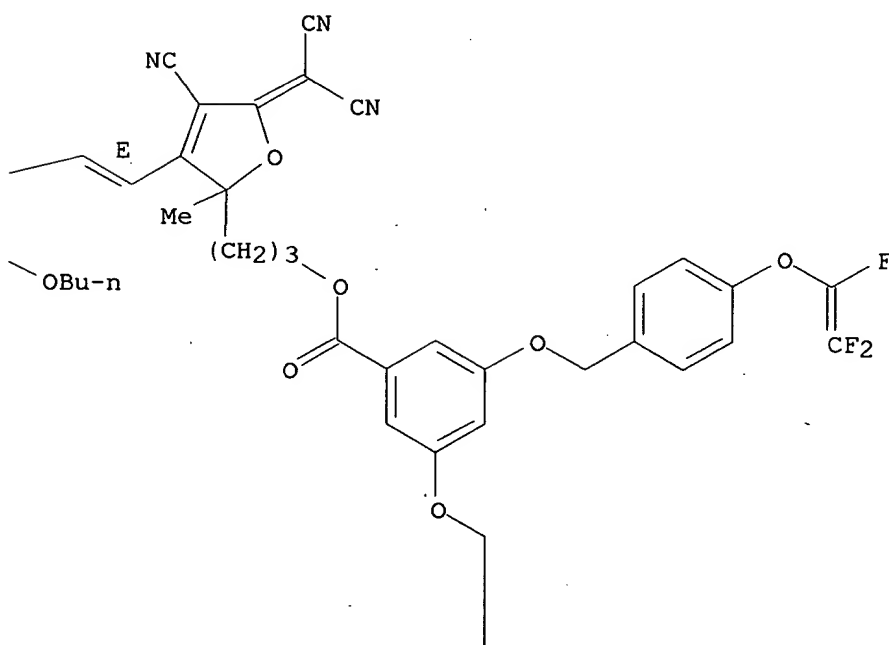
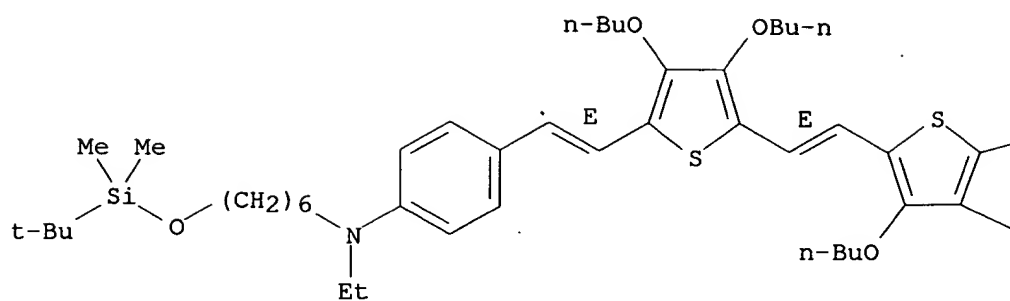
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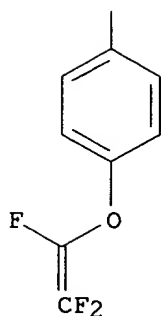


RN 701235-55-4 CA

CN Benzoic acid, 3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]-, 3-[4-cyano-3-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-[[6-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]hexyl]ethylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]-5-(dicyanomethylene)-2,5-dihydro-2-methyl-2-furanyl]propyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.

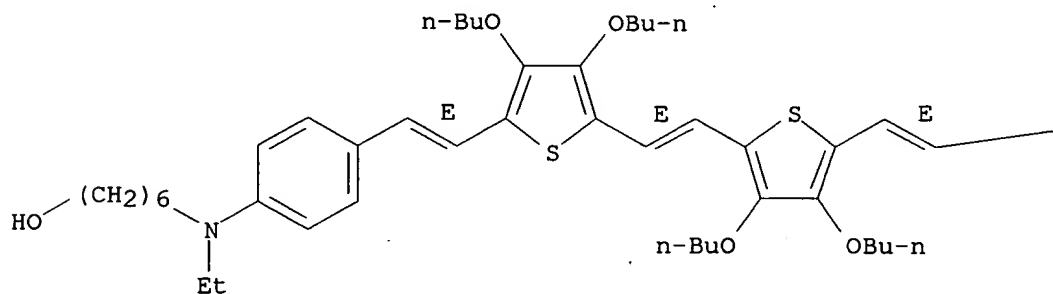


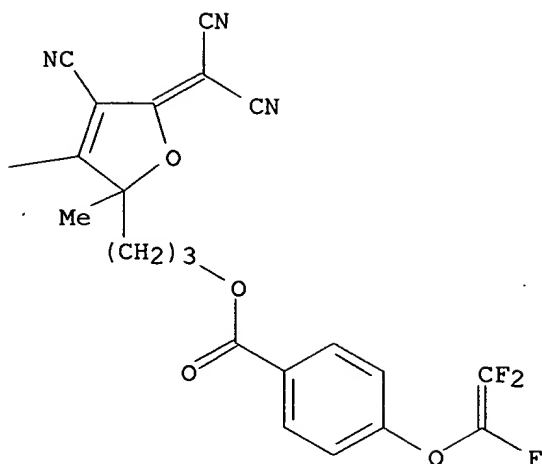


RN 701235-57-6 CA

CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, 3-[4-cyano-3-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-[ethyl(6-hydroxyhexyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]-5-(dicyanomethylene)-2,5-dihydro-2-methyl-2-furanyl]propyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.

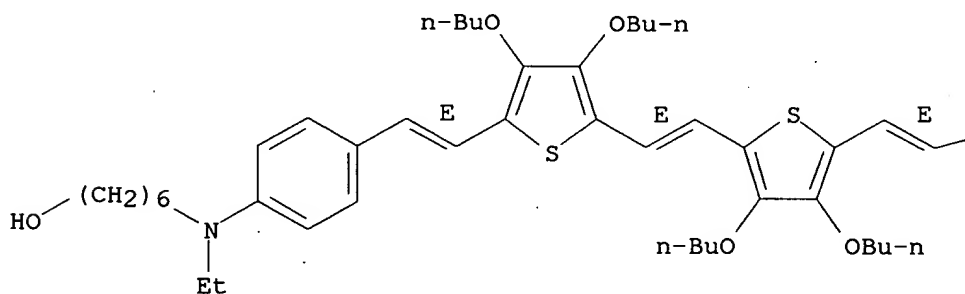


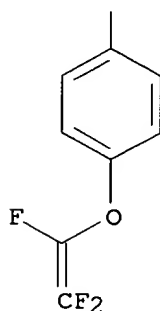
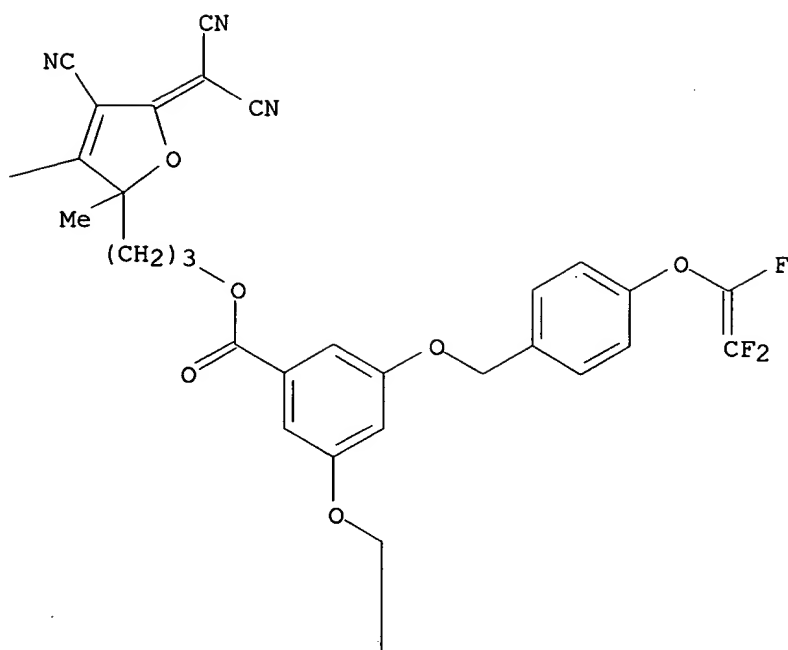


RN 701235-59-8 CA

CN Benzoic acid, 3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]-, 3-[4-cyano-3-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-ethyl(6-hydroxyhexyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]-5-(dicyanomethylene)-2,5-dihydro-2-methyl-2-furanyl]propyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.

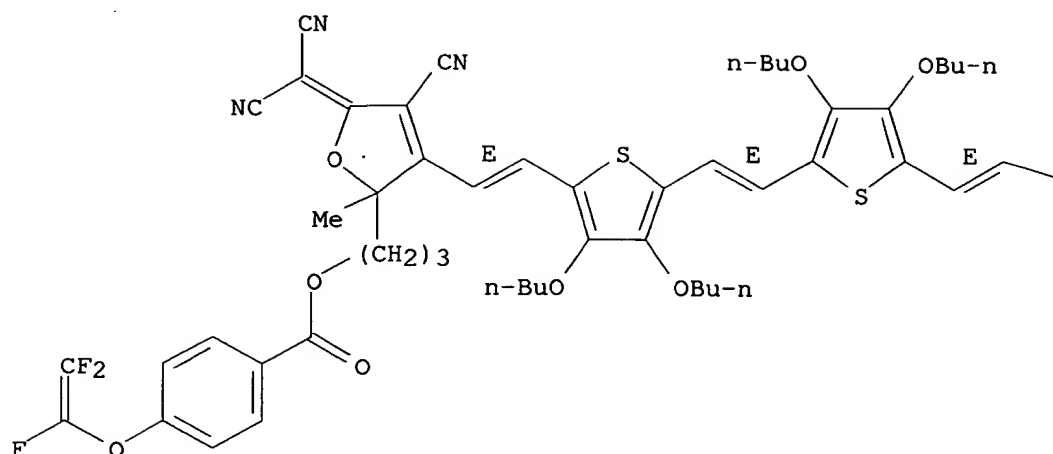




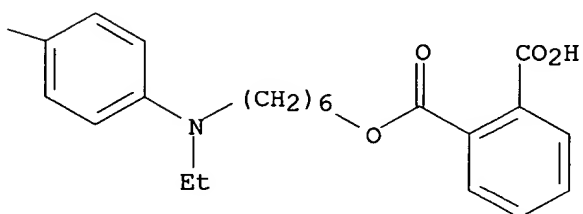
RN 701235-61-2 CA
 CN 1,2-Benzenedicarboxylic acid, mono[6-[[4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-2-[3-[[4-[(trifluoroethenyl)oxy]benzoyloxy]propyl]-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]ethylamino]hexyl] ester (9CI)
 (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



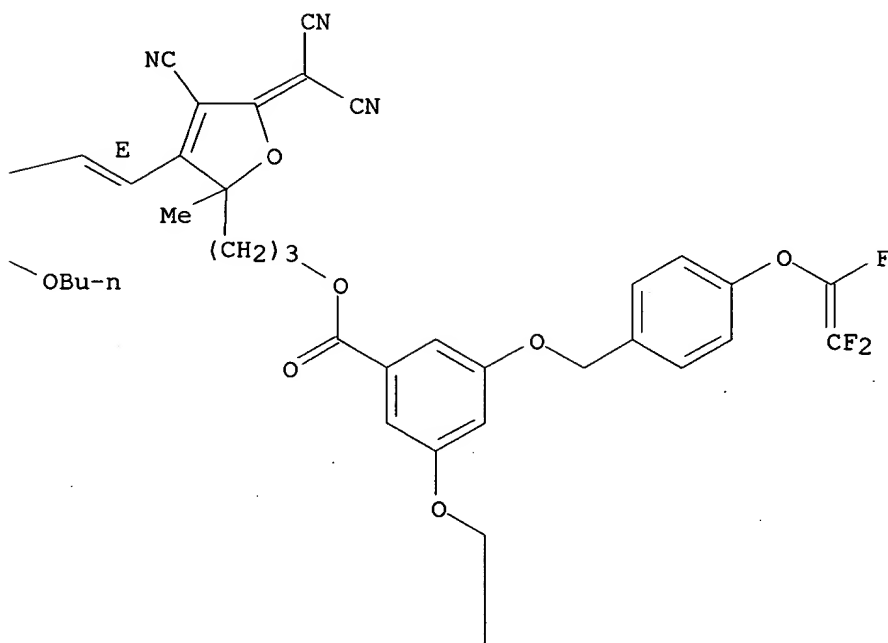
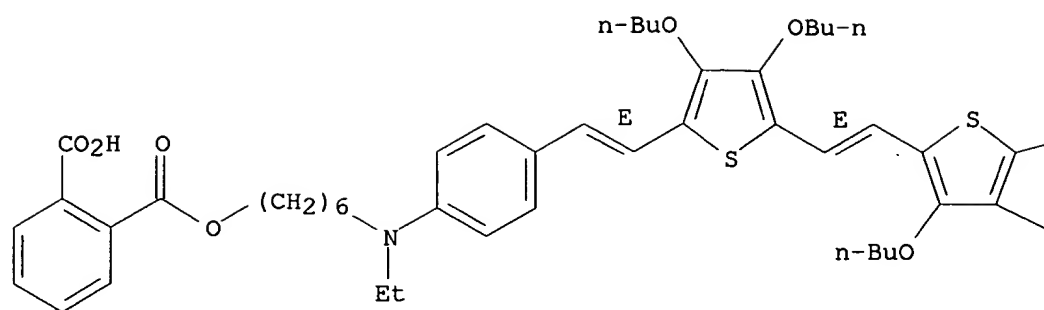
PAGE 1-B

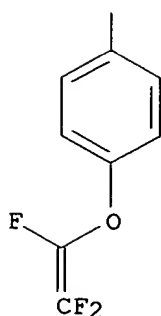


RN 701235-63-4 CA

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Double bond geometry as shown.





L25 ANSWER 11 OF 28 CA COPYRIGHT 2005 ACS on STN

AN 141:44659 CA

ED Entered STN: 08 Jul 2004

TI Second order **nonlinear optical** chromophores, polymers,
and electro-optic devices

IN Huang, Diyun; Chen, Baoquan

PA Lumera Corporation, USA

SO PCT Int. Appl., 36 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM G01N

CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related
Properties)

FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2004048927	A2	20040610	WO 2003-US37180	20031119
	WO 2004048927	A3	20050707		
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	RW:	BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	US 2003107027	A1	20030612	US 2002-301978	20021122
	US 6750603	B2	20040615		
	US 2004132960	A1	20040708	US 2003-625371	20030723
	CA 2505881	AA	20040610	CA 2003-2505881	20031119
	EP 1573391	A2	20050914	EP 2003-789898	20031119
	R:	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK			
PRAI	US 2002-301978	A2	20021122		
	US 2003-625371	A2	20030723		
	US 2000-226267P	P	20000817		
	US 2001-932831	A2	20010817		
	US 2003-395610	A2	20030324		
	WO 2003-US37180	W	20031119		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2004048927	ICM	G01N
WO 2004048927	ECLA	G02F001/361D2; G02F001/361F4
US 2003107027	NCL	252/582.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2
US 2004132960	NCL	528/377.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2; G02F001/361F4

AB The invention refers to a **nonlinear optical** chromophore D- π -A, wherein π is a π bridge including a thiophene ring having O atoms bonded directly to the 3 and 4 positions of the thiophene ring, D is a donor, and A is an acceptor, and compns. that include a linear polymer and the chromophore as a pendant group.

ST second order **nonlinear optical** chromophore polymer electrooptical device

IT Optics
(electrooptics; second order **nonlinear optical** chromophores, polymers containing same, and electro-optic devices therefrom)

IT Polymers, uses
RL: DEV (Device component use); USES (Uses)
(linear; second order **nonlinear optical** chromophores, polymers containing same, and electro-optic devices therefrom)

IT **Nonlinear optical** materials
(second order **nonlinear optical** chromophores, polymers containing same, and electro-optic devices therefrom)

IT Chromophores
(second order **nonlinear optical**; second order **nonlinear optical** chromophores, polymers containing same, and electro-optic devices therefrom)

IT **540777-78-4P 540777-79-5P 540777-80-8P 701235-67-8P 701235-70-3P**
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(second order **nonlinear optical** chromophores, polymers containing same, and electro-optic devices therefrom)

IT 68-12-2, Dimethylformamide, reactions 85-44-9, 1,3-Isobenzofurandione 108-24-7, Acetyl acetate 603-35-0, Triphenyl phosphine, reactions 653-34-9, Pentafluoro styrene 18162-48-6, TBDMS-Cl 126673-34-5, 3,4-Dibutoxy thiophene 134151-67-0 134151-77-2 156780-48-2 171082-32-9 392662-56-5 392662-60-1 701235-49-6
RL: RCT (Reactant); RACT (Reactant or reagent)
(second order **nonlinear optical** chromophores, polymers containing same, and electro-optic devices therefrom)

IT 147212-47-3P 273940-68-4P 273940-69-5P 273940-70-8P 400760-60-3P 540777-72-8P 540777-73-9P 540777-74-0P 540777-75-1P 540777-76-2P 540777-77-3P 701235-41-8P 701235-43-0P 701235-45-2P 701235-47-4P 701235-51-0P **701235-53-2P 701235-55-4P 701235-57-6P 701235-59-8P 701235-61-2P 701235-63-4P**
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(second order **nonlinear optical** chromophores, polymers containing same, and electro-optic devices therefrom)

IT 540777-78-4P 701235-67-8P 701235-70-3P

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

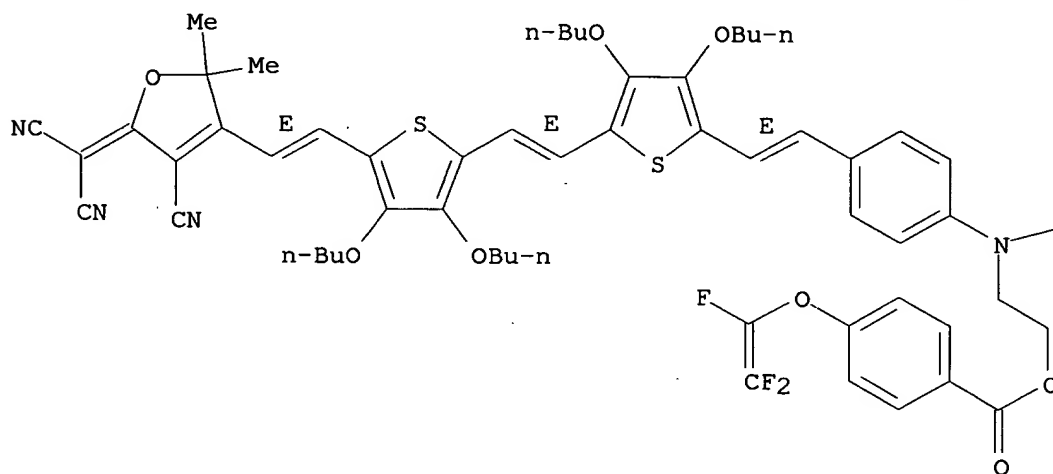
(second order **nonlinear optical** chromophores, polymers containing same, and electro-optic devices therefrom)

RN 540777-78-4 CA

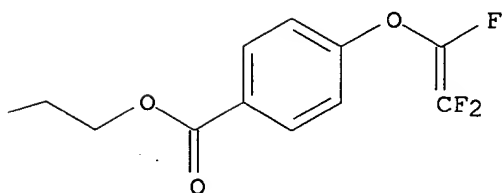
CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B



RN 701235-67-8 CA

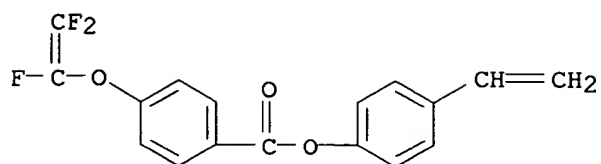
CN 1,2-Benzenedicarboxylic acid, 6-[[4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-2-[3-[[4-[(trifluoroethenyl)oxy]benzoyl]oxy]propyl]-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]ethylamino]hexyl 4-ethenylphenyl ester, polymer with 4-ethenylphenyl 4-[(trifluoroethenyl)oxy]benzoate (9CI) (CA INDEX NAME)

09/912,444

CM 1

CRN 701235-66-7

CMF C17 H11 F3 O3



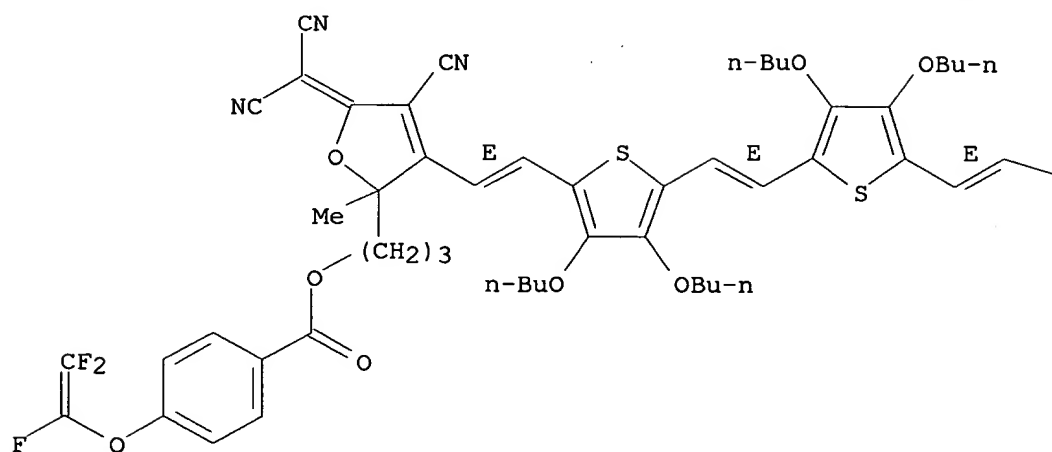
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CRN 701235-65-6

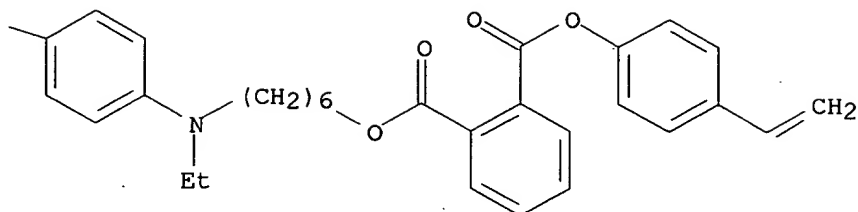
CMF C81 H87 F3 N4 O12 S2

Double bond geometry as shown.

PAGE 1-A



9/20/2005



RN 701235-70-3 CA

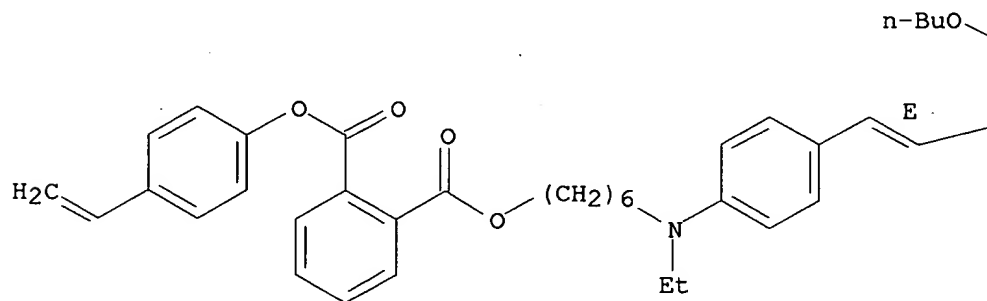
CN 1,2-Benzenedicarboxylic acid, 6-[[4-[(1E)-2-[5-[(1E)-2-[5-[(1E)-2-[2-[3-[[3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]benzoyl]oxy]propyl]-4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-3-furanyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]phenyl]ethylamino]hexyl 4-ethenylphenyl ester, polymer with 4-ethenylphenyl 4-[(trifluoroethenyl)oxy]benzoate (9CI) (CA INDEX NAME)

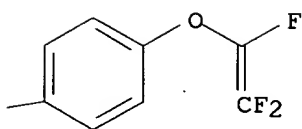
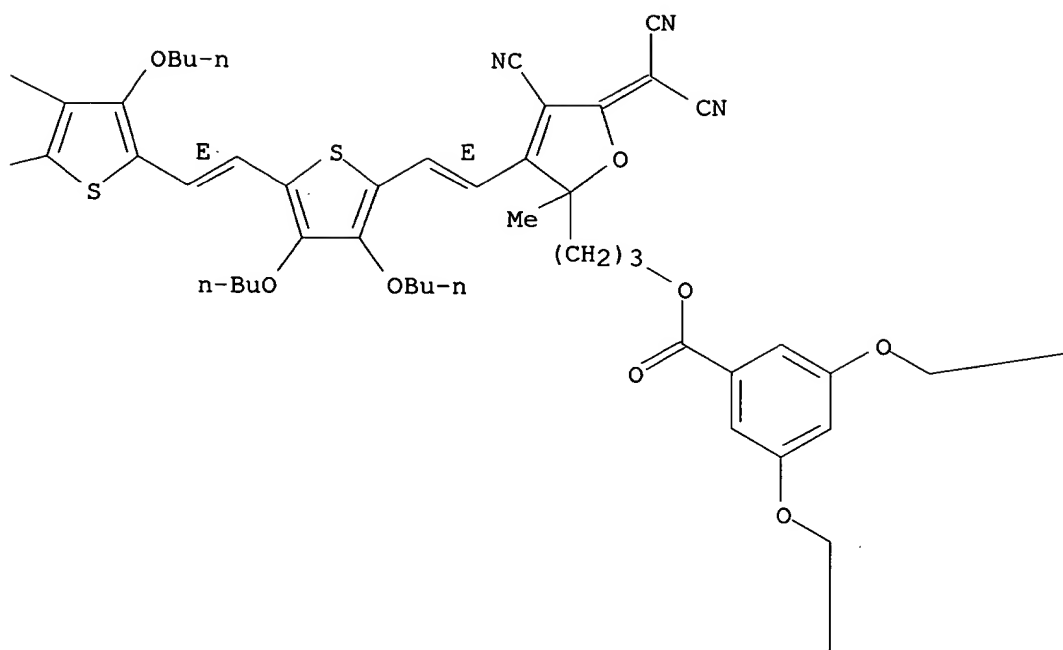
CM 1

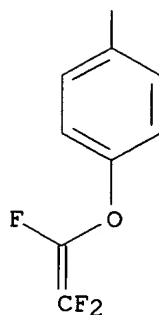
CRN 701235-69-0

CMF C97 H98 F6 N4 O15 S2

Double bond geometry as shown.



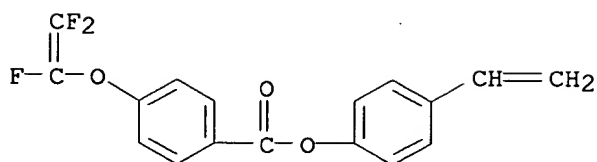




CM 2

CRN 701235-66-7

CMF C17 H11 F3 O3



IT 701235-53-2P 701235-55-4P 701235-57-6P

701235-59-8P 701235-61-2P 701235-63-4P

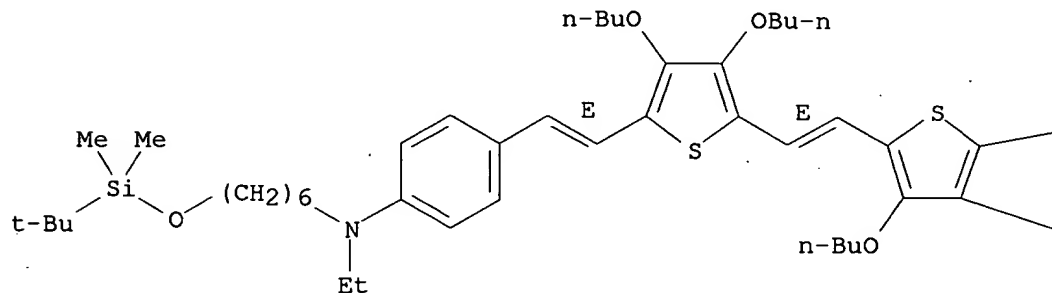
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

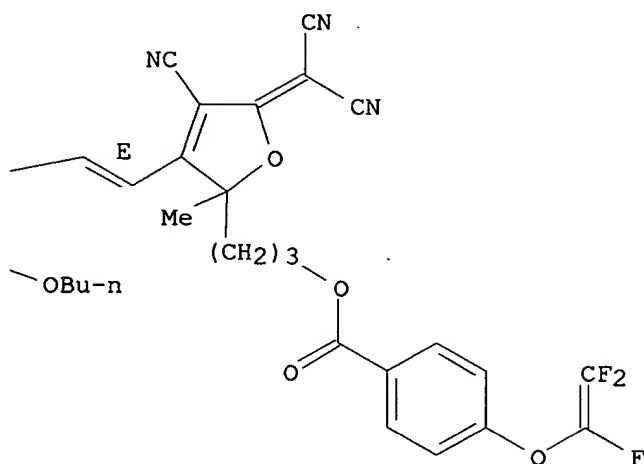
(second order **nonlinear optical** chromophores,
polymers containing same, and electro-optic devices therefrom)

RN 701235-53-2 CA

CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, 3-[4-cyano-3-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-[[6-[[[1,1-dimethylethyl]dimethylsilyl]oxy]hexyl]ethylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]-5-(dicyanomethylene)-2,5-dihydro-2-methyl-2-furanyl]propyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.

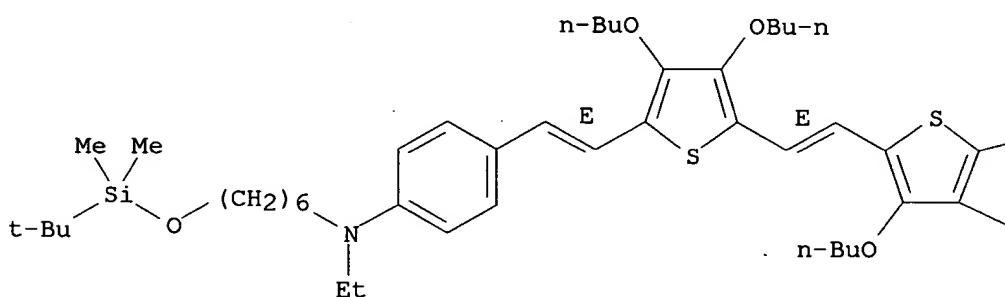


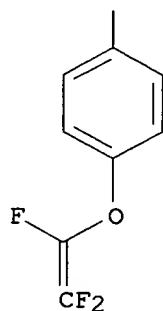
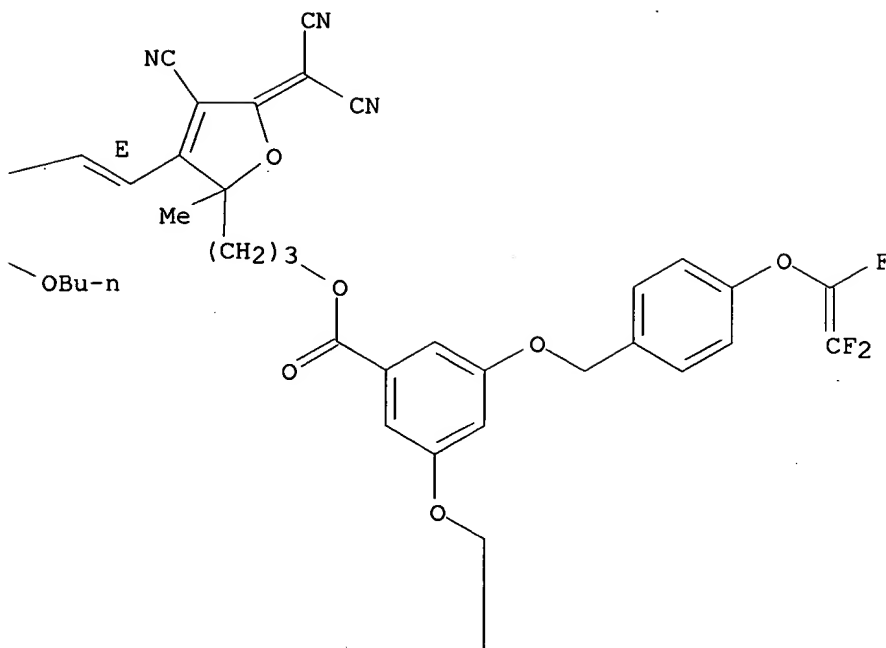


RN 701235-55-4 CA

CN Benzoic acid, 3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]-, 3-[4-cyano-3-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-[[6-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]hexyl]ethylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]-5-(dicyanomethylene)-2,5-dihydro-2-methyl-2-furanyl]propyl ester (9CI) (CA INDEX NAME)

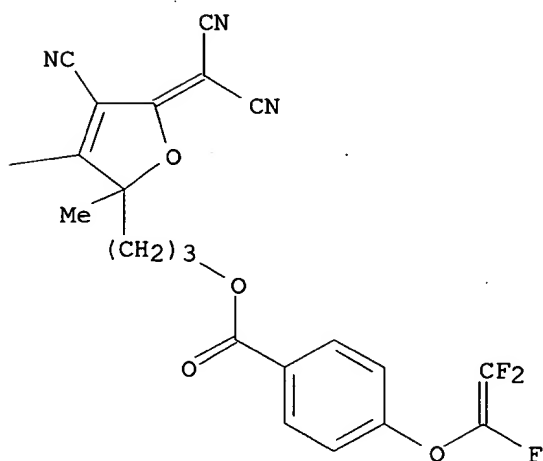
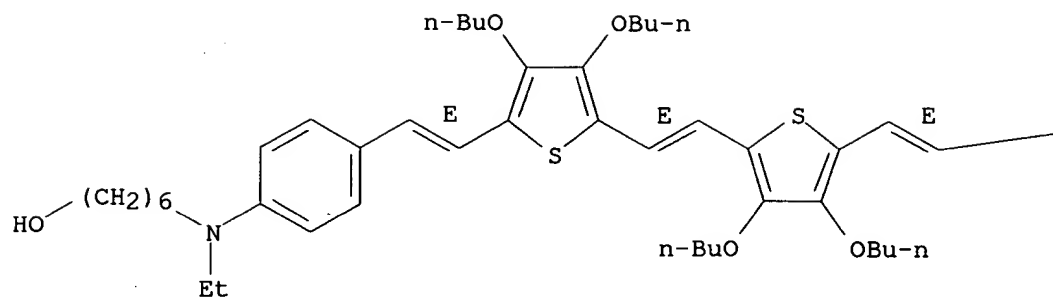
Double bond geometry as shown.





RN 701235-57-6 CA
 CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, 3-[4-cyano-3-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-ethyl(6-hydroxyhexyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-5-(dicyanomethylene)-2,5-dihydro-2-methyl-2-furanyl]propyl ester (9CI) (CA INDEX NAME)

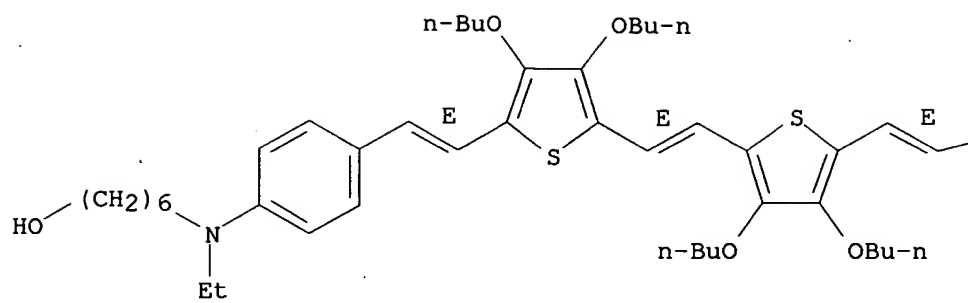
Double bond geometry as shown.



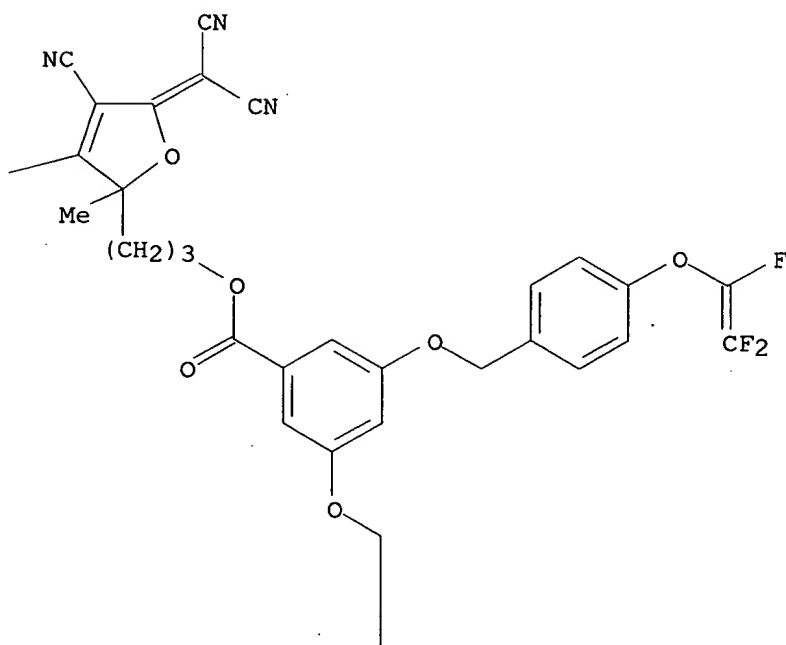
RN 701235-59-8 CA
 CN Benzoic acid, 3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]-, 3-[4-cyano-3-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-ethyl(6-hydroxyhexyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]-5-(dicyanomethylene)-2,5-dihydro-2-methyl-2-furanyl]propyl ester (9CI) (CA INDEX NAME)

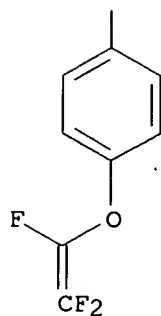
Double bond geometry as shown.

PAGE 1-A



PAGE 1-B

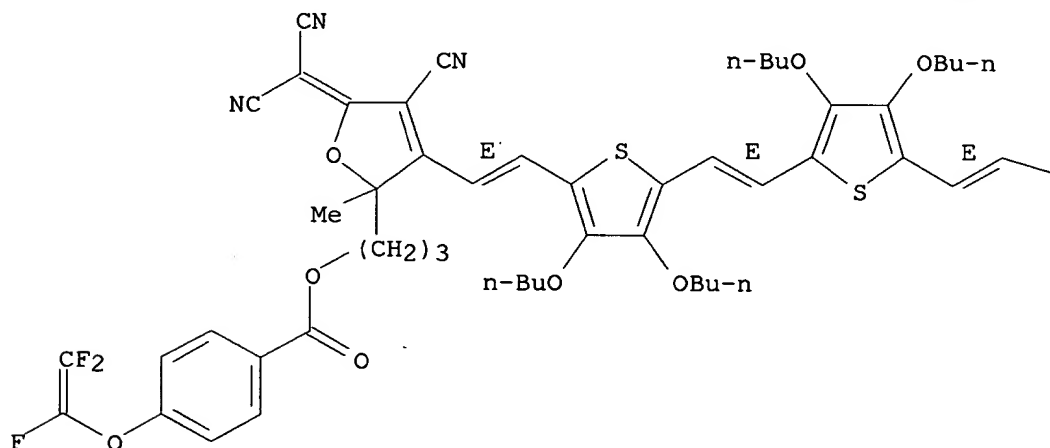


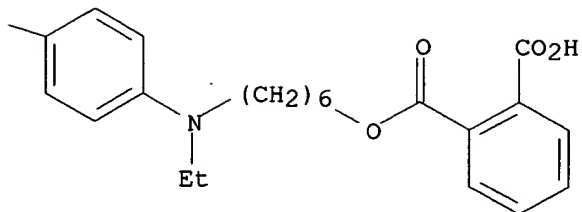


RN 701235-61-2 CA

CN	1,2-Benzenedicarboxylic acid, mono[6-[[4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4'-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-2-[3-[[4-[(trifluoroethenyl)oxy]benzoyl]oxy]propyl]-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]ethylamino]hexyl] ester (9CI) (CA INDEX NAME)
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Double bond geometry as shown.

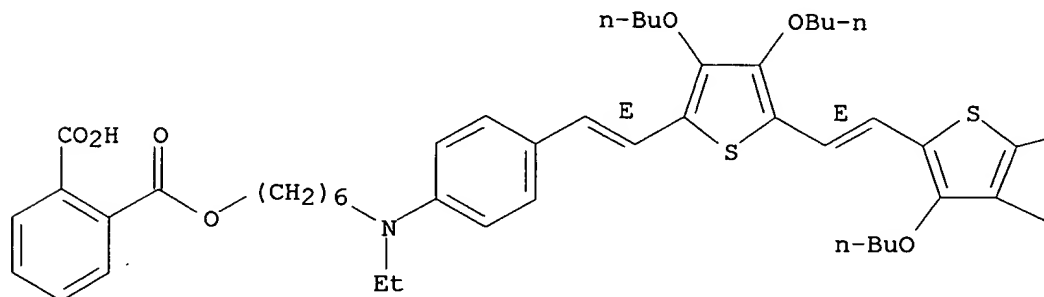


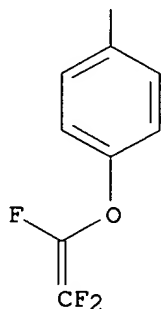
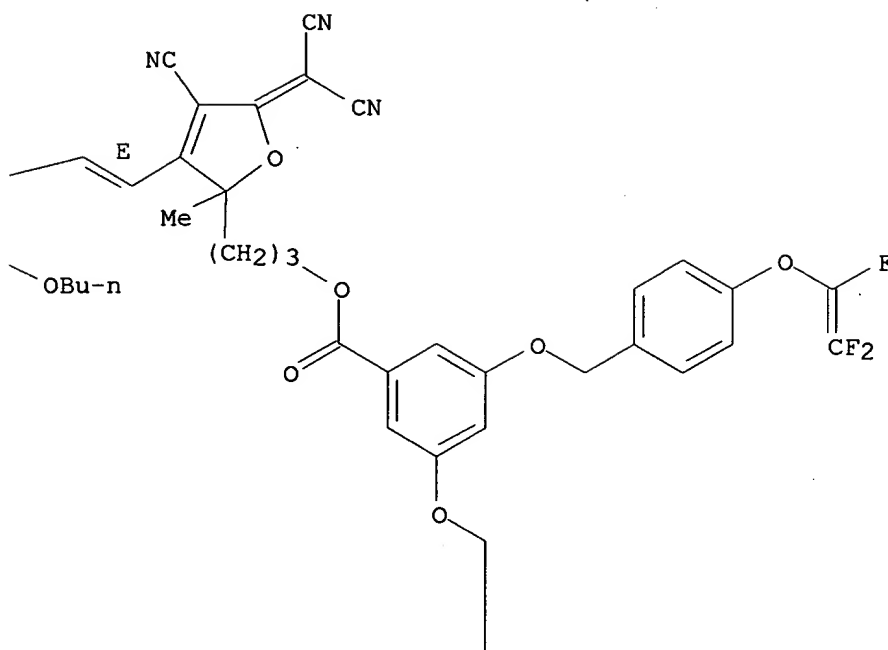


RN 701235-63-4 CA

CN 1,2-Benzenedicarboxylic acid, mono[6-[[4-[(1E)-2-[5-[(1E)-2-[5-[(1E)-2-[2-[3-[[3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]benzoyl]oxy]propyl]-4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-3-furanyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]phenyl]ethylamino]hexyl] ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.





L25 ANSWER 12 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 140:182100 CA
 ED Entered STN: 11 Mar 2004
 TI A Side-Chain Dendronized **Nonlinear Optical** Polyimide
 with Large and Thermally Stable Electrooptic Activity
 AU Luo, Jingdong; Haller, Marnie; Li, Hongxiang; Tang, Hong-Zhi; Jen, Alex
 K.-Y.; Jakka, Kavitha; Chou, Chia-Hung; Shu, Ching-Fong
 CS Department of Material Science and Engineering, University of Washington,
 Seattle, WA, 98195, USA
 SO Macromolecules (2004), 37(2), 248-250
 CODEN: MAMOBX; ISSN: 0024-9297
 PB American Chemical Society
 DT Journal
 LA English

- CC 36-5 (Physical Properties of Synthetic High Polymers)
Section cross-reference(s): 73, 76
- AB High-Tg aromatic polyimide with pendant dendronized **NLO** chromophores functionalized on a cardo bisphenol linkage backbone were synthesized and characterized. High poling efficiency has been achieved to afford a very large electrooptical coefficient (71 pm/V at 1.3 μm). More than 90% of this value can be retained at 85° for more than 650 h.
- ST electrooptical effect polyimide **NLO** dendron pendant thermal stability poling
- IT Polyimides, properties
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation) (cardo, fluorine-containing; synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- IT Refractive index
(nonlinear; synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- IT Dielectric polarization
(poling efficiency; synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- IT Fluoropolymers, properties
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation) (polyimide-, cardo; synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- IT Cardo polymers
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation) (polyimides, fluorine-containing; synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- IT Electrooptical effect
Nonlinear optical materials
Thermal stability
Third-order **nonlinear optical** susceptibility
(synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- IT 62-53-3, Aniline, reactions 53133-99-6
RL: RCT (Reactant); RACT (Reactant or reagent)
(monomer synthesis; synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- IT 42523-29-5P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(monomer synthesis; synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- IT 657862-72-1P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(monomer; synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- IT **658690-18-7P**
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)

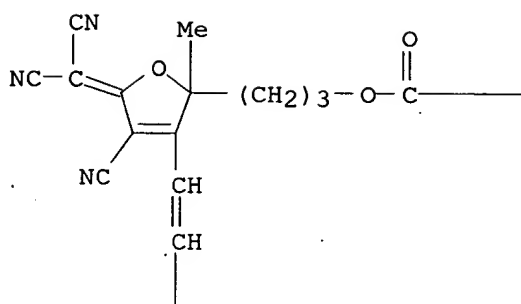
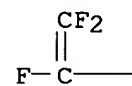
- (synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- IT 602-94-8, Perfluorobenzoic acid **502558-67-0**
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- IT 657862-78-7P 657862-84-5P
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
 (synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
- (1) Burland, D; Chem Rev 1994, V94, P31 CA
 - (2) Chen, T; J Am Chem Soc 1995, V117, P7295 CA
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 - (4) Davey, M; Chem Mater 2000, V12, P1679 CA
 - (5) Hsiao, S; J Polym Sci, Part A: Polym Chem 1999, V37, P1403 CA
 - (6) Kajzar, F; Adv Polym Sci 2003, V161, P1 CA
 - (7) Katz, H; Mater Res Soc Symp Proc 1987, V109, P127
 - (8) Korshak, V; J Macromol Sci, Rev Macromol Chem Part C 1974, V11, P45 CA
 - (9) Lee, M; Science 2002, V298, P1401 CA
 - (10) Liakatas, I; Appl Phys Lett 2000, V76, P1368 CA
 - (11) Luo, J; Adv Mater 2002, V14, P1763 CA
 - (12) Luo, J; Chem Commun 2002, P888 CA
 - (13) Ma, H; Adv Funct Mater 2002, V12, P565 CA
 - (14) Ma, H; Adv Mater 2001, V13, P1201 CA
 - (15) Ma, H; J Am Chem Soc 2001, V123, P986 CA
 - (16) Marder, S; Nature (London) 1997, V388, P845 CA
 - (17) Marks, T; Angew Chem, Int Ed Engl 1995, V34, P155 CA
 - (18) Robinson, B; Chem Phys 1999, V245, P35 CA
 - (19) Robinson, B; J Phys Chem A 2000, V104, P4785 CA
 - (20) Saadeh, H; J Mater Chem 1999, V9, P1865 CA
 - (21) Shi, Y; Science 2000, V288, P119 CA
 - (22) Teng, C; Appl Phys Lett 1990, V56, P1734 CA
 - (23) Verbiest, T; Science 1995, V268, P1604 CA
 - (24) Yang, C; J Polym Sci, Part A: Polym Chem 1993, V31, P2153 CA
 - (25) Zhang, C; Chem Mater 2001, V13, P3043 CA
- IT **658690-18-7P**
 RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
 (synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)
- RN 658690-18-7 CA
- CN 1,3-Isobenzofurandione, 5,5'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis-, polymer with 9,9-bis(4-aminophenyl)-9H-fluorene-2,7-diol, 6-[[4-[2-[3-[3-[2-[3-[[3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]benzoyl]oxy]propyl]-4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-3-furanyl]-2-propenylidene]-5,5-dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]ethylamino]hexyl hydrogen 1,2-benzenedicarboxylate (ester) pentafluorobenzoate (ester) (9CI) (CA INDEX NAME)

CM 1

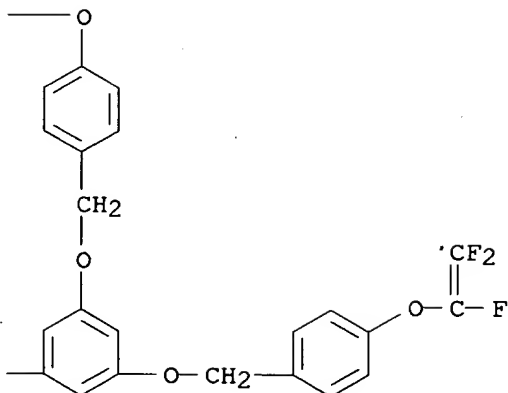
09/912,444

CRN 502558-67-0
CMF C72 H66 F6 N4 O11

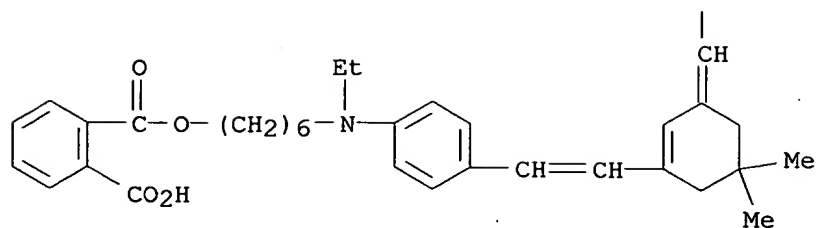
PAGE 1-A



PAGE 1-B



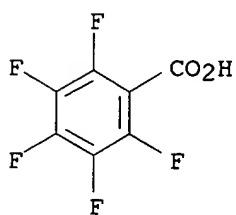
9/20/2005



CM 2

CRN 602-94-8

CMF C7 H F5 O2



CM 3

CRN 657862-78-7

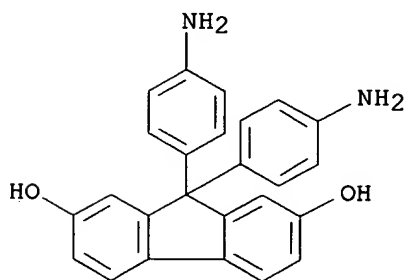
CMF (C25 H20 N2 O2 . C19 H6 F6 O6) x

CCI PMS

CM 4

CRN 657862-72-1

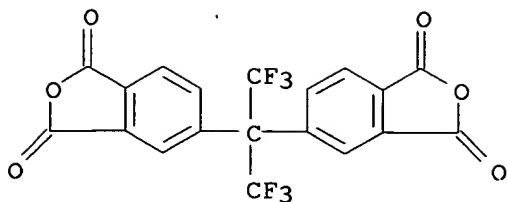
CMF C25 H20 N2 O2



CM 5

CRN 1107-00-2

CMF C19 H6 F6 O6



IT 502558-67-0

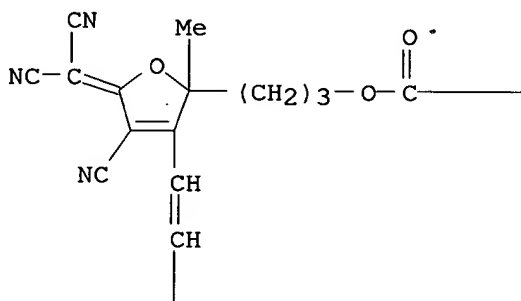
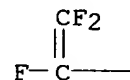
RL: RCT (Reactant); RACT (Reactant or reagent)

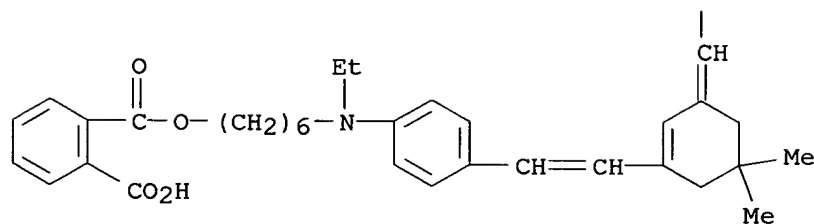
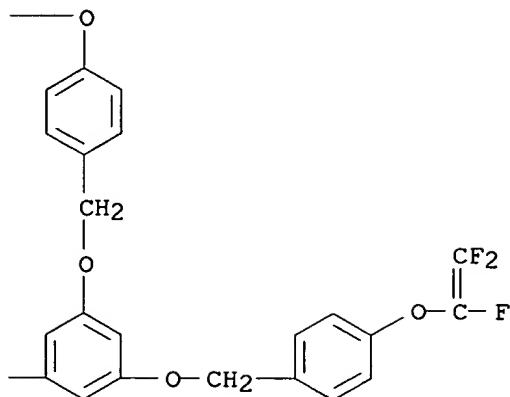
(synthesis, characterization, and electrooptical properties of thermally stable cardo polyimide with pendant dendronized **NLO** chromophores)

RN 502558-67-0 CA

CN 1,2-Benzenedicarboxylic acid, mono[6-[[4-[2-[3-[3-[2-[3-[[3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]benzoyl]oxy]propyl]-4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-3-furanyl]-2-propenylidene]-5,5-dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]ethylamino]hexyl] ester (9CI)
(CA INDEX NAME)

PAGE 1-A





L25 ANSWER 13 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 140:84155 CA
 ED Entered STN: 29 Jan 2004
 TI Star-shaped azo based dipolar chromophores: Design, synthesis, matrix compatibility and electro-optic activity
 AU Gopalan, Padma; Katz, Howard E.; McGee, Dave J.; Erben, Chris; Zielinski, Tom; Bousquet, Danielle; Muller, David; Grazul, John; Olsson, Ylva
 CS Bell Laboratories, Lucent Technologies, Murray Hill, NJ, 07974, USA
 SO PMSE Preprints (2003), 89, 271-272
 CODEN: PPMRA9; ISSN: 1550-6703
 PB American Chemical Society
 DT Journal; (computer optical disk)
 LA English
 CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
 AB The authors demonstrated a simple high yielding synthetic procedure involving 3 to 6 steps towards the 1st dendritic azo-based **NLO** chromophores. These chromophores could be poled in a polycarbonate host to achieve a EO coefficient of ≤ 25 pmN at 1550 nm. STEM studies to correlate blend morphol. with the electrooptic activity, indicates that these high mol. weight chromophores form incompatible blends in methacrylate copolymer where as they disperse predominantly into 2 to 20nm domains in amorphous polycarbonate matrix.
 ST **nonlinear optical** azo dipolar chromophore

electrooptical device

IT Electrooptical effect
(activity; star-shaped azo based dipolar chromophores: design, synthesis, matrix compatibility and electro-optic activity)

IT Optical activity
(electrooptical; star-shaped azo based dipolar chromophores: design, synthesis, matrix compatibility and electro-optic activity)

IT Chromophores
Nonlinear optical materials
(star-shaped azo based dipolar chromophores: design, synthesis, matrix compatibility and electro-optic activity)

IT 639523-38-9P
RL: PNU (Preparation, unclassified); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(star-shaped azo based dipolar chromophores: design, synthesis, matrix compatibility and electro-optic activity)

IT 639523-48-1P 639523-50-5P
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(star-shaped azo based dipolar chromophores: design, synthesis, matrix compatibility and electro-optic activity)

IT 152243-43-1 639523-36-7 **639523-41-4** 639523-44-7
RL: RCT (Reactant); RACT (Reactant or reagent)
(star-shaped azo based dipolar chromophores: design, synthesis, matrix compatibility and electro-optic activity)

IT 639523-46-9
RL: TEM (Technical or engineered material use); USES (Uses)
(star-shaped azo based dipolar chromophores: design, synthesis, matrix compatibility and electro-optic activity)

RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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- (2) Lee, M; Applied Physics Letters 2002, V81, P1474 CA
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- (7) Teng, C; Appl Phys Lett 1990, V56, P1734 CA
- (8) Voyles, P; Nature 2002, V416, P826 CA
- (9) Zhang, H; Applied Physics Letters 2001, V78(20), P3136 CA

IT **639523-41-4**
RL: RCT (Reactant); RACT (Reactant or reagent)
(star-shaped azo based dipolar chromophores: design, synthesis, matrix compatibility and electro-optic activity)

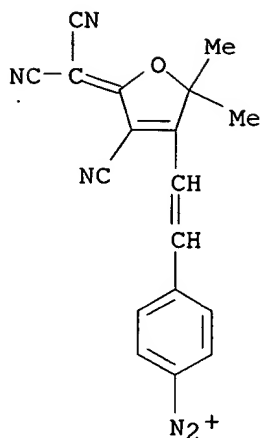
RN 639523-41-4 CA

CN Benzenediazonium, 4-[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-, hexafluorophosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 639523-40-3

CMF C18 H12 N5 O

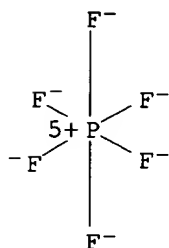


CM 2

CRN 16919-18-9

CMF F6 P

CCI CCS



L25 ANSWER 14 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 140:42644 CA
 ED Entered STN: 15 Jan 2004
 TI Highly efficient and thermally stable electro-optic polymer from a smartly controlled crosslinking process
 AU Luo, Jingdong; Haller, Marnie; Li, Hongxiang; Kim, Tae-Dong; Jen, Alex K.-Y.
 CS Department of Materials Science and Engineering, University of Washington, Seattle, WA, 98195-2120, USA
 SO Advanced Materials (Weinheim, Germany) (2003), 15(19), 1635-1638
 CODEN: ADVMEW; ISSN: 0935-9648
 PB Wiley-VCH Verlag GmbH & Co. KGaA
 DT Journal
 LA English
 CC 35-8 (Chemistry of Synthetic High Polymers)
 Section cross-reference(s): 73
 AB Three different functional moieties including the derivs. of a Cheng-Larry-Dalton-type chromophore, a capped maleimide, and furanic ring were sequentially attached onto poly(4-vinylphenol) as side chains to afford a crosslinkable **nonlinear optical** polymer. A smartly controlled thermal reversible crosslinking through Diels-Alder and

- retro Diels-Alder reactions allowed the bulky chromophore to be efficiently poled at the linear thermoplastic stage. The resulting material showed a combination of a very large electrooptical coefficient r_{33} value (76 pm V⁻¹ at 1.3 μ m) and good temporal stability at 70°.
- ST electrooptic polyvinylphenol chromophore maleimide furan deriv crosslinking
- IT Electrooptical effect
(preparation of highly efficient and thermally stable electro-optic polymer from smartly controlled crosslinking process)
- IT Fluoropolymers, preparation
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
(preparation of highly efficient and thermally stable electro-optic polymer from smartly controlled crosslinking process)
- IT 24979-70-2DP, Poly(4-vinylphenol), reaction products with Cheng-Larry-Dalton-type chromophore, maleimide derivative, and furan derivative 105578-55-ODP, reaction products with poly(vinylphenol), Cheng-Larry-Dalton-type chromophore, and maleimide derivative **502558-67-ODP**, reaction products with poly(vinylphenol), maleimide derivative, and furan derivative 637025-84-4DP, reaction products with poly(vinylphenol), Cheng-Larry-Dalton-type chromophore, and furan derivative
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
(preparation of highly efficient and thermally stable electro-optic polymer from smartly controlled crosslinking process)

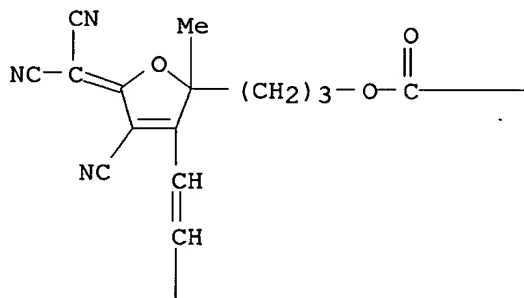
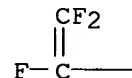
RE.CNT 38 THERE ARE 38 CITED REFERENCES AVAILABLE FOR THIS RECORD

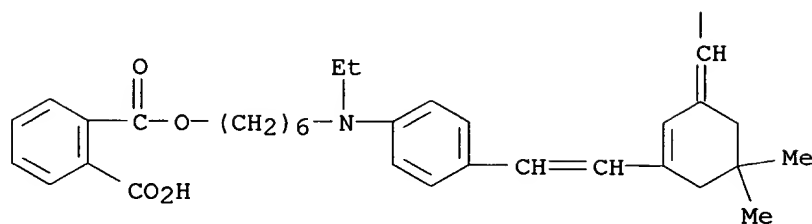
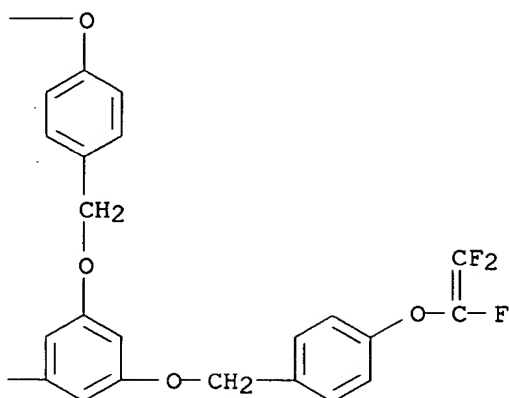
RE

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- IT 502558-67-ODP, reaction products with poly(vinylphenol), maleimide derivative, and furan derivative
 RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
 (preparation of highly efficient and thermally stable electro-optic polymer from smartly controlled crosslinking process)
- RN 502558-67-0 CA
 CN 1,2-Benzenedicarboxylic acid, mono[6-[[4-[2-[3-[3-[2-[3-[[3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]benzoyl]oxy]propyl]-4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-3-furanyl]-2-propenylidene]-5,5-dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]ethylamino]hexyl] ester (9CI)
 (CA INDEX NAME)

PAGE 1-A





L25 ANSWER 15 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 140:34537 CA
 ED Entered STN: 08 Jan 2004
 TI Focused microwave-assisted synthesis of 2,5-dihydrofuran derivatives as electron acceptors for highly efficient **nonlinear optical** chromophores
 AU Liu, Sen; Haller, Marnie A.; Luo, Jingdong; Jang, Sei-Hum; Ma, Hong; Dalton, Larry R.; Jen, Alex K.-Y.
 CS Departments of Materials Science and Engineering and Chemistry, University of Washington, Seattle, WA, 98195, USA
 SO Materials Research Society Symposium Proceedings (2003), 771 (Organic and Polymeric Materials and Devices), 375-380
 CODEN: MRSPDH; ISSN: 0272-9172
 PB Materials Research Society
 DT Journal
 LA English
 CC 76-14 (Electric Phenomena)
 Section cross-reference(s): 22, 27, 35, 72
 AB A diversified family of 2,5-dihydrofuran derivs. has been synthesized as a new class of highly efficient and tunable electron acceptors using the single-mode focused microwave irradiation. High poling efficiency and very large electro-optic coeffs. (r₃₃ values of 128 and 116 pm/V at 1.3 μm) have been demonstrated using 2-dicyanomethylene-3-cyano-4,5-dimethyl-5-trifluoromethyl-2,5-dihydrofuran (CF₃-TCF)-based chromophores as dopant in

- poly(Me methacrylate) (PMMA) and a high glass-transition temperature polyquinoline (PQ-100) resp. Films were doped with [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]propanedinitrile. Excellent dipole alignment stability has also been demonstrated in the guest/host composite at 85°C. Multi-functionalized **NLO** chromophores based on hydroxy containing 2,5-dihydrofuran acceptors were also synthesized through microwave methodol. for further characterizations.
- ST microwave dihydrofuran electron acceptor **nonlinear optical** chromophore; polyquinoline microwave dihydrofuran electron acceptor **nonlinear optical** chromophore; methacrylate microwave dihydrofuran electron acceptor **nonlinear optical** chromophore; film microwave dihydrofuran electron acceptor **nonlinear optical** chromophore; electrooptical material microwave dihydrofuran electron acceptor **nonlinear optical** chromophore; HOMO MO microwave dihydrofuran electron acceptor **nonlinear optical** chromophore; LUMO MO microwave dihydrofuran electron acceptor **nonlinear optical** chromophore
- IT Electron acceptors
Electrooptical materials
HOMO (molecular orbital)
LUMO (molecular orbital)
Microwave
 Nonlinear optical materials
 (focused microwave-assisted synthesis of dihydrofuran derivs. as electron acceptors for highly efficient **nonlinear optical** chromophores)
- IT Chromophores
 (**nonlinear optical** chromophores; focused microwave-assisted synthesis of dihydrofuran derivs. as electron acceptors for highly efficient **nonlinear optical** chromophores)
- IT **613237-39-1**, [3-Cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]propanedinitrile **613237-40-4**, [3-Cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]propanedinitrile **613237-41-5**, [3-Cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile **613237-42-6**, [3-Cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile **634195-67-8**
634195-68-9
RL: PRP (Properties)
 (focused microwave-assisted synthesis of dihydrofuran derivs. as electron acceptors for highly efficient **nonlinear optical** chromophores)
- IT 9011-14-7, Poly(methyl methacrylate) 142084-73-9, PQ-100 (polyquinoline)
RL: PRP (Properties)
 (thin films doped with [cyano[[[(aminophenyl)butadienyl]thienyl]ethenyl]furanylidene]propanedinitrile; focused microwave-assisted synthesis of dihydrofuran derivs. as electron acceptors for highly efficient **nonlinear optical** chromophores)
- RE.CNT 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Ahlmeim, M; Science 1996, V271, P335
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- (7) Ermer, S; private communication
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- (11) Lee, M; Science 2002, V298, P1401 CA
- (12) Luo, J; Adv Mater 2002, V14(23), P1763 CA
- (13) Ma, S; Adv Func Mater 2002, V12, P565
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- (24) Wu, X; J Am Chem Soc 1999, V121, P472 CA

IT **613237-39-1**, [3-Cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]propanedinitrile **613237-40-4**, [3-Cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]propanedinitrile **634195-68-9**

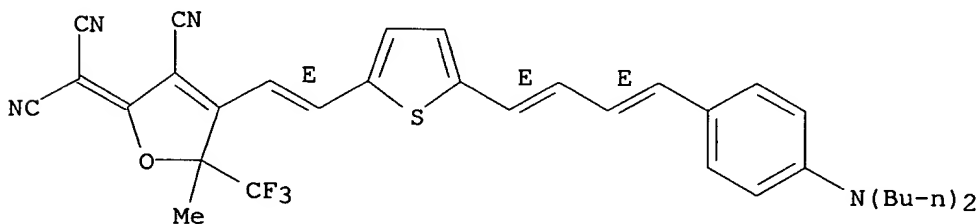
RL: PRP (Properties)

(focused microwave-assisted synthesis of dihydrofuran derivs. as electron acceptors for highly efficient **nonlinear optical** chromophores)

RN 613237-39-1 CA

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

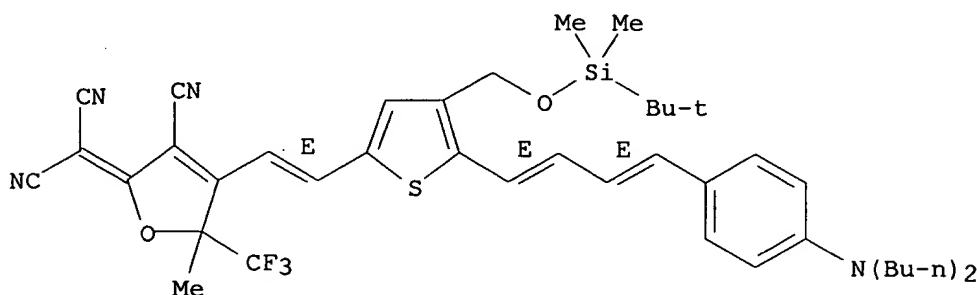


RN 613237-40-4 CA

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-

dimethylethyl)dimethylsilyl]oxy)methyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

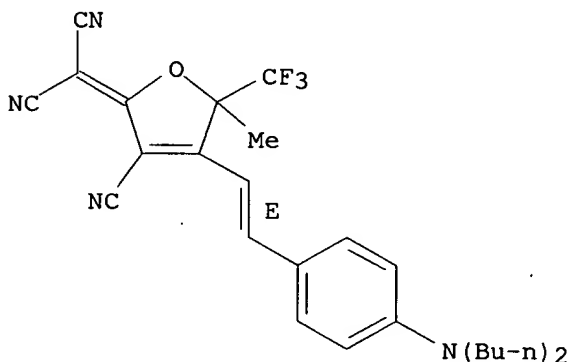
Double bond geometry as shown.



RN 634195-68-9 CA

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[4-(dibutylamino)phenyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



L25 ANSWER 16 OF 28 CA COPYRIGHT 2005 ACS on STN

AN 139:323382 CA

ED Entered STN: 13 Nov 2003

TI Focused microwave-assisted synthesis of 2,5-dihydrofuran derivatives as electron acceptors for highly efficient **nonlinear optical** chromophores

AU Liu, Sen; Haller, Marnie A.; Ma, Hong; Dalton, Larry R.; Jang, Sei-Hum; Jen, Alex K.-Y.

CS Department of Materials Science and Engineering, University of Washington, Seattle, WA, 98195-2120, USA

SO Advanced Materials (Weinheim, Germany) (2003), 15(7-8), 603-607
CODEN: ADVMEW; ISSN: 0935-9648

PB Wiley-VCH Verlag GmbH & Co. KGaA

DT Journal

LA English

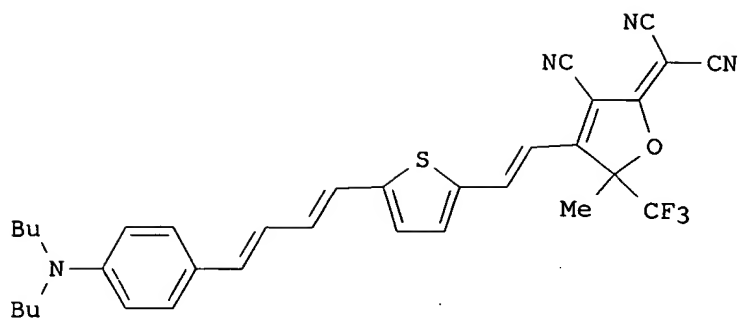
CC 27-6 (Heterocyclic Compounds (One Hetero Atom))

Section cross-reference(s): 36

OS CASREACT 139:323382

GI

9/20/2005



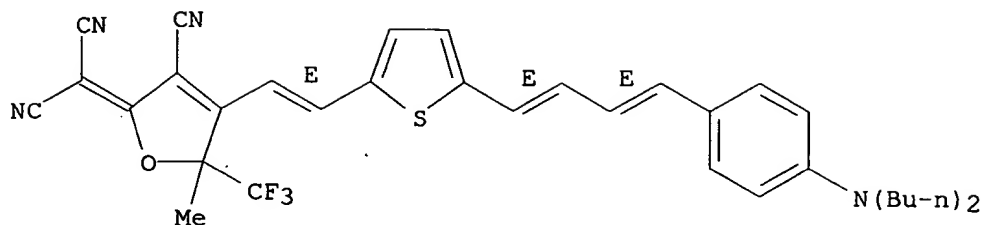
- AB A very diversified family of 2,5-dihydrofuran derivs., e.g., I, was prepared as a new class of tunable electron acceptors using single-mode focused microwave irradiation. A high poling efficiency and very large r_{33} values (128 and 116 pm V⁻¹ at 1.3 μ m) were demonstrated using I in polymethyl methacrylate and a high-temperature polyquinoline (PQ-100). An excellent long-term temporal stability was demonstrated in the PQ guest/host system.
- ST electron acceptor dihydrofuran deriv prepn microwave; **nonlinear optical** chromophore dihydrofuran deriv prepn microwave; polymer additive dihydrofuran deriv **nonlinear optical** chromophore
- IT Electron acceptors
Nonlinear optical materials
 (focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT Microwave
 (irradiation; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT **613237-39-1P 613237-40-4P 613237-41-5P**
 RL: MOA (Modifier or additive use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
 (focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 9011-14-7, Poly(methyl methacrylate 142084-73-9, PQ-100
 RL: POF (Polymer in formulation); USES (Uses)
 (focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT **613237-43-7 613237-44-8**
 RL: PRP (Properties)
 (focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 613237-42-6P
 RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
 (focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 613237-31-3P 613237-32-4P 613237-33-5P 613237-35-7P
 RL: SPN (Synthetic preparation); PREP (Preparation)

- (focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 364599-35-9P
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
 (intermediate, condensation with active methylene compds.; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 613237-34-6P
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
 (intermediate, condensation with malononitrile; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 613237-36-8P
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
 (intermediate, conversion to hydroxy ketone; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 661-78-9P
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
 (intermediate, cyclocondensation with malononitrile; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 369609-49-4P
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
 (intermediate, reaction with thiophenecarboxaldehyde derivative; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 2739-97-1, 2-Pyridineacetonitrile
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prereactant with 3-hydroxy-3-methyl-2-butanone; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 421-50-1, 1,1,1-Trifluoroacetone
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prereactant with Et vinyl ether; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 105-56-6, Ethyl cyanoacetate 5217-47-0, N,N'-Diethylthiobarbituric acid 13218-13-8, Nitroacetonitrile
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prereactant with dihydroiminofurancarbonitrile; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 613237-37-9 613237-38-0
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prereactant with furanylidene malononitrile derivs.; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)
- IT 109-77-3, Malononitrile
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prereactant with hydroxy ketones; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear**

- optical chromophores)**
- IT 115-22-0, 3-Hydroxy-3-methyl-2-butanone
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prereactant with malononitrile; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical chromophores**)
- IT 171082-32-9
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prereactant with thiophenecarboxaldehyde derivative; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical chromophores**)
- IT 109-92-2, Ethyl vinyl ether
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prereactant with trifluoroacetone; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical chromophores**)
- RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
- (1) Ahlmeim, M; Science 1996, V271, P335
 - (2) Anon; Nonlinear Optical Properties of Organic Molecules and Crystals 1987
 - (3) Anon; Photonic Polymer Systems: Fundamentals, Methods, and Applications 1998, P847
 - (4) Boldt, P; Chem Commun 1996, P793 CA
 - (5) Burland, D; Chem Rev 1994, V94, P31 CA
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 - (17) Marks, T; Angew Chem Int Ed Engl 1995, V34, P155 CA
 - (18) Melikian, G; Synth Commun 1995, V25, P3045 CA
 - (19) Samyn, C; Macromol Rapid Commun 2000, V21, P1 CA
 - (20) Shi, Y; Science 2000, V288, P119 CA
 - (21) Sun, S; Chem Mater 1996, V8, P2539 CA
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 - (23) Teng, C; Appl Phys Lett 1990, V56, P1734 CA
 - (24) Villemin, D; Synth Commun 2001, V31, P1771 CA
 - (25) Wu, X; J Am Chem Soc 1999, V121, P472 CA
- IT 613237-39-1P 613237-40-4P
 RL: MOA (Modifier or additive use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
 (focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical chromophores**)
- RN 613237-39-1 CA
- CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

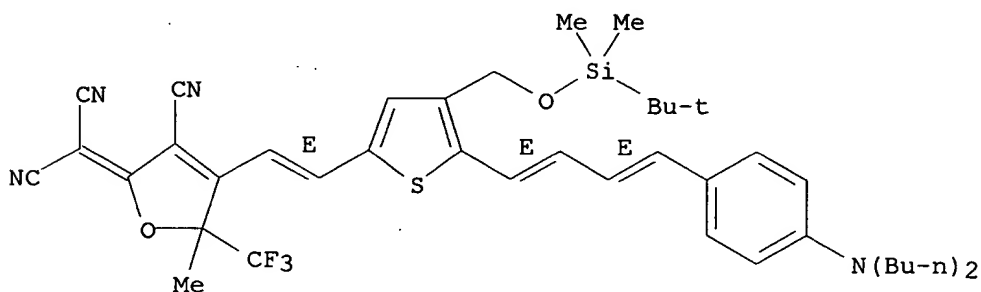
09/912,444



RN 613237-40-4 CA

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



IT 613237-43-7

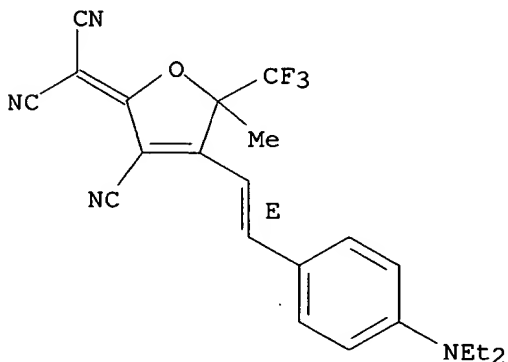
RL: PRP (Properties)

(focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)

RN 613237-43-7 CA

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



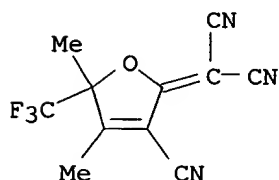
IT 369609-49-4P

9/20/2005

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(intermediate, reaction with thiophenecarboxaldehyde derivative; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for **nonlinear optical** chromophores)

RN 369609-49-4 CA

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(trifluoromethyl)-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



L25 ANSWER 17 OF 28 CA COPYRIGHT 2005 ACS on STN

AN 139:43992 CA

ED Entered STN: 10 Jul 2003

TI Second order **nonlinear optical** chromophores containing a donor and an acceptor part linked by a π -bridge including a substituted thiophene ring; and electrooptical devices employing the chromophores

IN Huang, Diyun; Chen, Baoquan

PA Lumera Corp., USA

SO U.S. Pat. Appl. Publ., 15 pp., Cont.-in-part of U.S. Ser. No. 932,831. CODEN: USXXCO

DT Patent

LA English

IC ICM F21V009-00

ICS G03B011-00; C07D049-14; C07D413-14; G02B005-02; G02C007-10

INCL 252582000; 548228000; 548243000; 548315100; 546102000; 546312000; 546152000; 546095000; 549059000; 359260000

CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 22, 27, 38, 76

FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2003107027	A1	20030612	US 2002-301978	20021122
	US 6750603	B2	20040615		
	US 2002160282	A1	20021031	US 2001-932831	20010817
	US 6716995	B2	20040406		
	US 2003201713	A1	20031030	US 2003-387715	20030313
	US 6822384	B2	20041123		
	US 2003183812	A1	20031002	US 2003-395610	20030324
	US 2003205701	A1	20031106	US 2003-439621	20030516
	US 6864375	B2	20050308		
	US 2004132960	A1	20040708	US 2003-625371	20030723
	CA 2505881	AA	20040610	CA 2003-2505881	20031119
	WO 2004048927	A2	20040610	WO 2003-US37180	20031119
	WO 2004048927	A3	20050707		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM,

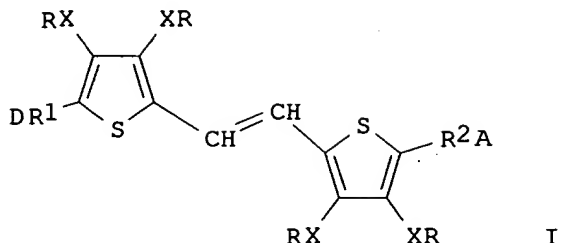
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 ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK,
 TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG
 EP 1573391 A2 20050914 EP 2003-789898 20031119
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
 IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK
 US 2004192942 A1 20040930 US 2004-757375 20040114
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 US 2002-301978 A1 20021122
 US 2003-395610 A2 20030324
 US 2003-625371 A 20030723
 WO 2003-US37180 W 20031119

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2003107027	ICM	F21V009-00
	ICS	G03B011-00; C07D049-14; C07D413-14; G02B005-02; G02C007-10
	INCL	252582000; 548228000; 548243000; 548315100; 546102000; 546312000; 546152000; 546095000; 549059000; 359260000
US 2003107027	NCL	252/582.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2
US 2002160282	NCL	430/007.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2
US 2003201713	NCL	313/504.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2
US 2003183812	NCL	252/583.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2; G02F001/361F4
US 2003205701	NCL	252/583.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2
US 2004132960	NCL	528/377.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2; G02F001/361F4
WO 2004048927	ECLA	G02F001/361D2; G02F001/361F4
US 2004192942	NCL	549/059.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2; G02F001/361F4
US 2004192940	NCL	549/042.000
	ECLA	C07D333/38; C07D409/06+333B+307B; C07D495/04+333B+319B; G02F001/361D2

OS MARPAT 139:43992

GI



- AB **Nonlinear optical** chromophores are described by the general formula I where, independently at each occurrence: R1 is absent or a π -bridge; R2 is absent or a π -bridge; D is a donor; A is an acceptor; X is O or S; and R is an alkyl, aryl, heteroalkyl, or heteroaryl group. **Nonlinear optical** chromophores having the formula D- π -A are also described, where π is a π -bridge including a thiophene ring having O atoms bonded directly to the 3 and 4 positions of the thiophene ring, D is a donor, and A is an acceptor. Second order **nonlinear optical** comps. comprising a polymer matrix and the nonlinear chromophores are also discussed as are electrooptical devices comprising the **nonlinear optical** comps.
- ST **nonlinear optical** chromophore electrooptical device donor acceptor thiophene bridge
- IT Chromophores
(**Nonlinear Optical**; second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene; and electrooptical devices employing chromophores)
- IT **Nonlinear optical** materials
(electrooptical; second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene; and electrooptical devices employing chromophores)
- IT Polymers, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(matrix in **NLO** system; second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene; and electrooptical devices employing chromophores)
- IT Electrooptical materials
(nonlinear; second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene; and electrooptical devices employing chromophores)
- IT Radar
(phased array system; second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene; and electrooptical devices employing chromophores)
- IT Optical instruments
(router; second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene; and electrooptical devices employing chromophores)

IT Electron acceptors
 Electron donors
 Electrooptical instruments
Nonlinear optical materials
 Optical couplers
 Optical switches
 Optical waveguides
 (second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene; and electrooptical devices employing chromophores)

IT Optical communication
 (systems; second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene; and electrooptical devices employing chromophores)

IT 132721-26-7
 RL: PEP (Physical, engineering or chemical process); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
 (matrix; second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene; and electrooptical devices employing chromophores)

IT 78-67-1 653-34-9, 2,3,4,5,6-Pentafluorostyrene 126673-34-5
 134151-67-0 134151-77-2 171082-32-9 392662-56-5 392662-60-1
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene prepared using)

IT 147212-47-3P 400760-60-3P 540777-72-8P 540777-73-9P 540777-75-1P
 540777-76-2P 540777-77-3P 540777-79-5P
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
 (second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene prepared using)

IT **540777-78-4P** 540777-80-8P
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PYP (Physical process); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)
 (second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene; and electrooptical devices employing chromophores)

IT 540777-74-0P
 RL: PEP (Physical, engineering or chemical process); PYP (Physical process); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)
 (second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene; and electrooptical devices employing chromophores)

RE.CNT 53 THERE ARE 53 CITED REFERENCES AVAILABLE FOR THIS RECORD

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IT **540777-78-4P**

RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PYP (Physical process); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)

(second-order **nonlinear optical** chromophores containing donor and acceptor parts linked by π -bridge including substituted thiophene; and electrooptical devices employing chromophores)

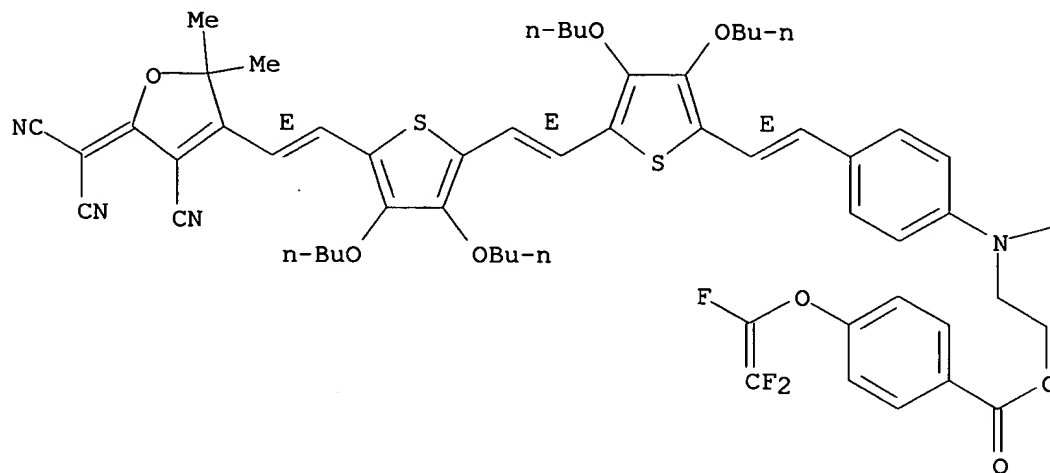
RN 540777-78-4 CA

CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[(1E)-2-[3,4-dibutoxy-5-

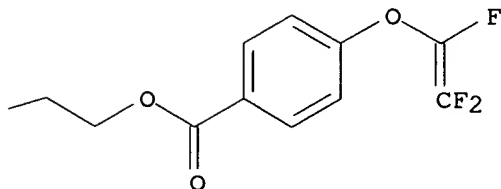
[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B



L25 ANSWER 18 OF 28 CA COPYRIGHT 2005 ACS on STN
AN 138:322077 CA
ED Entered STN: 15 May 2003
TI Crosslinkable monomers for novel **nonlinear optical**
polymers
IN Yu, Luping
PA The University of Chicago, USA
SO PCT Int. Appl., 58 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM G02F001-361
CC 37-3 (Plastics Manufacture and Processing)

Section cross-reference(s): 73

FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003032072	A2	20030417	WO 2002-US22531	20020715
	WO 2003032072	A3	20031218		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	US 2003086666	A1	20030508	US 2002-196328	20020715
	US 2003085388	A1	20030508	US 2002-196734	20020715
	US 2003092869	A1	20030515	US 2002-196565	20020715
	US 2003100681	A1	20030529	US 2002-196353	20020715
PRAI	US 2001-305374P	P	20010713		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2003032072	ICM	G02F001-361
WO 2003032072	ECLA	C07D211/94; C08G073/10F; G02F001/361D2; G02F001/361F2; G02F001/361F4
US 2003086666	NCL	385/122.000
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US 2003092869	NCL	528/170.000
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US 2003100681	NCL	525/242.000
	ECLA	C07D209/88; C07D211/94; C07D333/22; C07D333/60; C07D409/06+333B+239B; C07D409/06+333B+307B; C07D409/06+333B+333; C07D409/12+333B+209; C07D409/14+333B+239B+209; C07D409/14+333B+333+209; C08G073/10; C08G073/10F; G02F001/361D2; G02F001/361F2; G02F001/361F4
AB		Novel compns. and synthetic methods for forming nonlinear optic polymers, which may be incorporated into multiple light-based devices, are disclosed. These compns. include crosslinkable chromophoric monomer units

that incorporate nonlinear optic chromophores, linking monomers that may be used to link chromophoric monomers, and polymers made from crosslinkable chromophoric monomers or chromophoric monomers in combination with linking monomers. The polymers can exhibit high thermal stability, which is believed to arise from their covalently bonded chromophore structures. In one aspect, linking monomers are disclosed that may be crosslinked.

ST crosslinkable monomer novel **nonlinear optical** polymer

IT Polyimides, preparation

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(polyester-; synthesis of crosslinkable monomers for novel **nonlinear optical** polymers)

IT Polyesters, preparation

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(polyimide-; synthesis of crosslinkable monomers for novel **nonlinear optical** polymers)

IT **Nonlinear optical** materials

(synthesis of crosslinkable monomers for novel **nonlinear optical** polymers)

IT 488809-45-6P, 9-[3-[(4-Bromophenyl)methylamino]propyl]-9H-carbazole-2,7-diol 488809-46-7P, 4-Bromo-N-(3-bromopropyl)-N-methylbenzenamine 488809-47-8P, N-(4-Bromophenyl)-2,7-dimethoxy-N-methyl-9H-carbazole-9-propanamine 488809-48-9P, N-(4-Bromophenyl)-N-methyl-2,7-bis[[tris(1-methylethyl)silyl]oxy]-9H-carbazole-9-propanamine 488809-49-0P, 5-[2-[4-[[3-[2,7-Bis[[tris(1-methylethyl)silyl]oxy]-9H-carbazol-9-yl]propyl]methylamino]phenyl]ethenyl]-2-thiophenecarboxaldehyde 488809-50-3P, 5-[2-[4-[[3-(2,7-Dihydroxy-9H-carbazol-9-yl)propyl]methylamino]phenyl]ethenyl]-2-thiophenecarboxaldehyde 511535-48-1P, 4-Aminobenzoic acid 511535-50-5P 511535-52-7P 511535-57-2P

RL: IMF (Industrial manufacture); PRP (Properties); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

(intermediates; synthesis of crosslinkable monomers for novel **nonlinear optical** polymers)

IT 488809-51-4P, 5-[[5-[2-[4-[[3-(2,7-Dihydroxy-9H-carbazol-9-yl)propyl]methylamino]phenyl]ethenyl]-2-thienyl]methylene]-1,3-diethyl-2,4,6(1H,3H,5H)-pyrimidinetrione 488809-52-5P, 5-[[5-[2-[4-[[3-(2,7-Dihydroxy-9H-carbazol-9-yl)propyl]methylamino]phenyl]ethenyl]-2-thienyl]methylene]-1,3-diethyldihydro-2-thioxo-4,6(1H,5H)-pyrimidinedione 488809-53-6P, [2-[[5-[2-[4-[[3-(2,7-Dihydroxy-9H-carbazol-9-yl)propyl]methylamino]phenyl]ethenyl]-2-thienyl]methylene]-1,1-dioxidobenzo[b]thien-3(2H)-ylidene]propanedinitrile 488809-60-5P 488809-62-7P 488809-64-9P

RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(monomers; synthesis of crosslinkable monomers for novel **nonlinear optical** polymers)

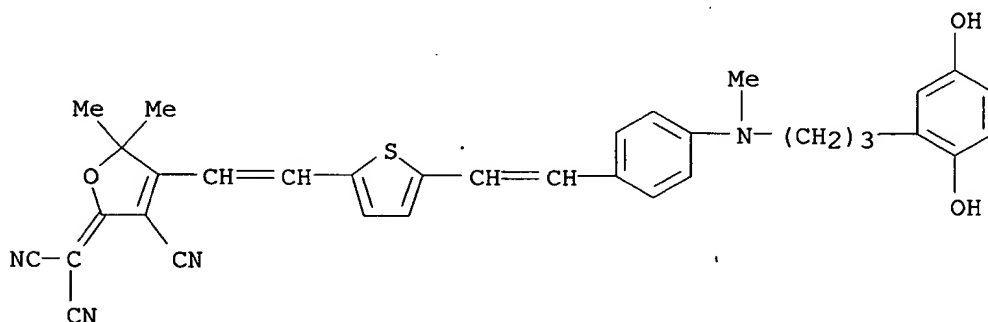
IT 18162-48-6P 53138-44-6P 90110-08-0P, 5-Vinyl-2-thiophenecarboxaldehyde

RL: IMF (Industrial manufacture); PRP (Properties); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

(starting materials; synthesis of crosslinkable monomers for novel **nonlinear optical** polymers)

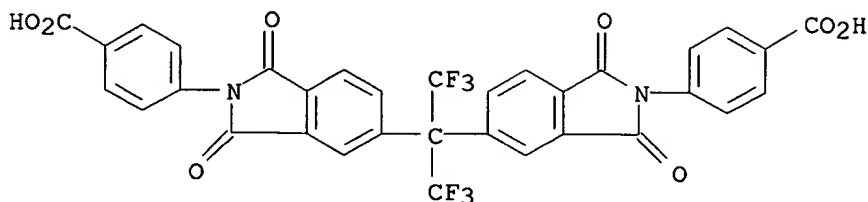
IT 109-64-8, 1,3-Dibromopropane 150-13-0, 4-Aminobenzoic acid 150-78-7, p-Methoxyanisole 693-13-0, Diisopropyl carbodiimide 6911-87-1, 4-Bromo-N-methylaniline 10294-33-4, Boron tribromide 50721-57-8, 1-Ethylbarbituric acid 61822-18-2, 2,7-Dimethoxy carbazole 65960-02-3,

- 1-Ethylidihydro-2-thioxo-4,6(1H,5H)-pyrimidinedione 74228-25-4,
3-(Dicyanomethylene)-2,3-dihydrobenzo[b]thiophene 1,1-dioxide
511535-54-9 511535-59-4 511535-61-8 511535-63-0
RL: RCT (Reactant); RACT (Reactant or reagent)
(starting materials; synthesis of crosslinkable monomers for novel
nonlinear optical polymers)
- IT 429-41-4, Tetrabutylammonium fluoride 3375-31-3 6163-58-2,
Tri-o-tolylphosphine
RL: CAT (Catalyst use); USES (Uses)
(synthesis of crosslinkable monomers for novel **nonlinear
optical** polymers)
- IT 133532-50-0P
RL: IMF (Industrial manufacture); PRP (Properties); RCT (Reactant); PREP
(Preparation); RACT (Reactant or reagent)
(synthesis of crosslinkable monomers for novel **nonlinear
optical** polymers)
- IT 488809-54-7P 488809-55-8P 488809-56-9P 488809-57-0P 488809-58-1P
488809-59-2P 488809-61-6P **488809-63-8P** 488809-65-0P
488831-45-4P 488832-61-7P 488832-64-0P
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or
engineered material use); PREP (Preparation); USES (Uses)
(synthesis of crosslinkable monomers for novel **nonlinear
optical** polymers)
- IT 102-82-9, Tributylamine 121-44-8, Triethylamine, reactions 91944-64-8,
4-(Dimethylamino)pyridinium 4-toluenesulfonate
RL: RGT (Reagent); RACT (Reactant or reagent)
(synthesis of crosslinkable monomers for novel **nonlinear
optical** polymers)
- IT **488809-63-8P**
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or
engineered material use); PREP (Preparation); USES (Uses)
(synthesis of crosslinkable monomers for novel **nonlinear
optical** polymers)
- RN 488809-63-8 CA
CN Benzoic acid, 4,4'-[[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis(1,3-
dihydro-1,3-dioxo-2H-isoindole-5,2-diyl)]bis-, polymer with
[3-cyano-4-[2-[5-[2-[4-[3-(2,5-dihydroxyphenyl)propyl]methylanino]phenyl]
ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-
furanlydene]propanedinitrile (9CI) (CA INDEX NAME)
- CM 1
- CRN 488809-62-7
CMF C34 H30 N4 O3 S



CM 2

CRN 133532-50-0
CMF C33 H16 F6 N2 O8



- L25 ANSWER 19 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 138:255621 CA
 ED Entered STN: 17 Apr 2003
 TI Design, synthesis, and properties of highly efficient side-chain
 dendronized **nonlinear optical** polymers for
 electro-optics
 AU Luo, Jingdong; Liu, Sen; Haller, Marnie; Liu, Lu; Ma, Hong; Jen, Alex
 K.-Y.
 CS Department of Materials Science and Engineering, University of Washington,
 Seattle, WA, 98195-2120, USA
 SO Advanced Materials (Weinheim, Germany) (2002), 14(23), 1763-1768
 CODEN: ADVMEW; ISSN: 0935-9648
 PB Wiley-VCH Verlag GmbH & Co. KGaA
 DT Journal
 LA English
 CC 35-8 (Chemistry of Synthetic High Polymers)
 Section cross-reference(s): 36, 73, 76
 AB A simple and generally applicable method is developed for the
 post-functionalization of side-chain dendronized **NLO** polymers.
 This approach provides the combined advantages of achieving better poling
 efficiency through the site-isolation effect and shortening the time
 required for EO dendrimer synthesis. High poling efficiency has been
 achieved to afford an exceptionally large EO coefficient (97 pmV⁻¹ at
 1.3μm).
 ST electrooptical effect poling side chain dendronized chromophore
 polyvinylphenol
 IT Electrooptical effect
 Nonlinear optical materials
 (design, synthesis, and properties of highly efficient side-chain
 dendronized **nonlinear optical** polymers for
 electro-optics)
 IT Fluoropolymers, preparation
 RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
 (design, synthesis, and properties of highly efficient side-chain
 dendronized **nonlinear optical** polymers for
 electro-optics)
 IT 85-44-9, Phthalic anhydride 502449-09-4 502449-11-8
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (dendron synthesis; design, synthesis, and properties of highly
 efficient side-chain dendronized **nonlinear optical**
 polymers for electro-optics)
 IT 502449-13-0P 502449-15-2P

- RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(dendron synthesis; design, synthesis, and properties of highly efficient side-chain dendronized **nonlinear optical** polymers for electro-optics)
- IT 538-75-0, N,N'-Dicyclohexylcarbodiimide 1122-58-3, 4-(Dimethylamino)pyridine 91944-64-8, 4-Dimethylaminopyridinium 4-toluenesulfonate
RL: RGT (Reagent); RACT (Reactant or reagent)
(dendron synthesis; design, synthesis, and properties of highly efficient side-chain dendronized **nonlinear optical** polymers for electro-optics)
- IT 502449-17-4P 502449-19-6P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(dendron; design, synthesis, and properties of highly efficient side-chain dendronized **nonlinear optical** polymers for electro-optics)
- IT 502558-65-8P 502558-68-1P 502558-70-5P
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
(design, synthesis, and properties of highly efficient side-chain dendronized **nonlinear optical** polymers for electro-optics)
- IT 24979-70-2, Poly(4-vinylphenol)
RL: RCT (Reactant); RACT (Reactant or reagent)
(design, synthesis, and properties of highly efficient side-chain dendronized **nonlinear optical** polymers for electro-optics)
- IT 502449-23-2
RL: RCT (Reactant); RACT (Reactant or reagent)
(pendent chromophore synthesis; design, synthesis, and properties of highly efficient side-chain dendronized **nonlinear optical** polymers for electro-optics)
- IT 502449-21-0P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(pendent chromophore synthesis; design, synthesis, and properties of highly efficient side-chain dendronized **nonlinear optical** polymers for electro-optics)
- IT 502449-25-4P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(pendent chromophore; design, synthesis, and properties of highly efficient side-chain dendronized **nonlinear optical** polymers for electro-optics)

RE.CNT 39 THERE ARE 39 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

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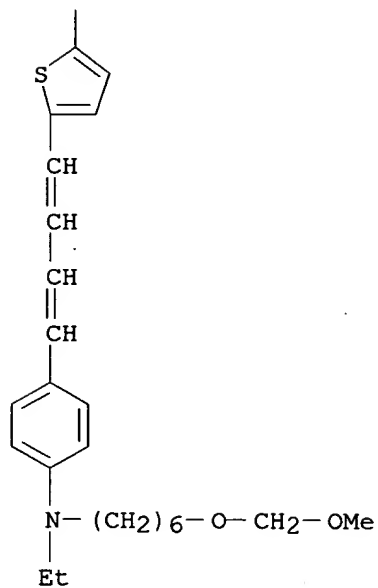
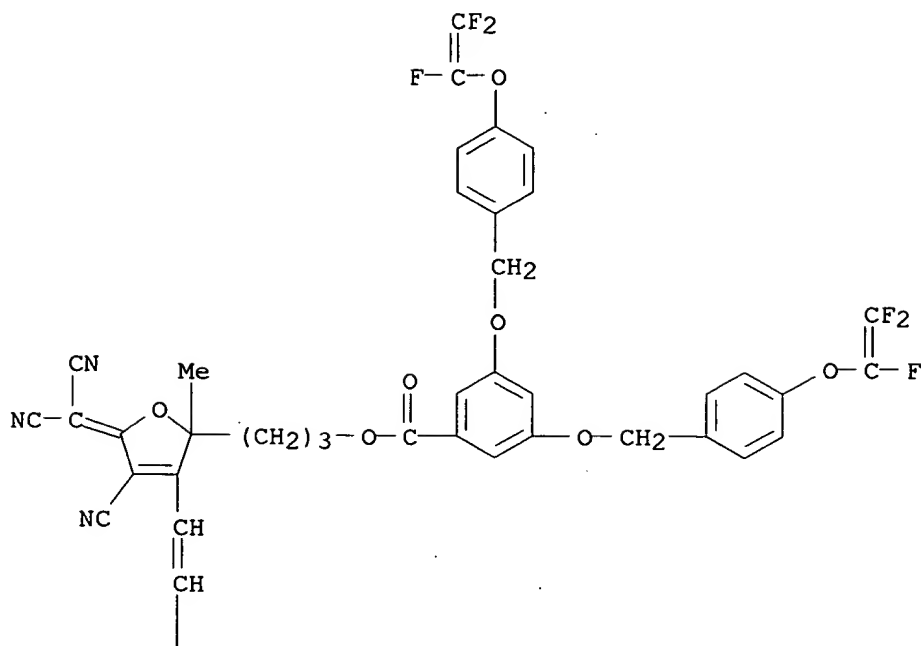
IT 502449-13-0P 502449-15-2P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(dendron synthesis; design, synthesis, and properties of highly efficient side-chain dendronized **nonlinear optical** polymers for electro-optics)

RN 502449-13-0 CA

CN Benzoic acid, 3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]-, 3-[4-cyano-5-(dicyanomethylene)-3-[2-[5-[4-[4-[ethyl[6-(methoxymethoxy)hexyl]amino]phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-2,5-dihydro-2-methyl-2-furanyl]propyl ester (9CI) (CA INDEX NAME)



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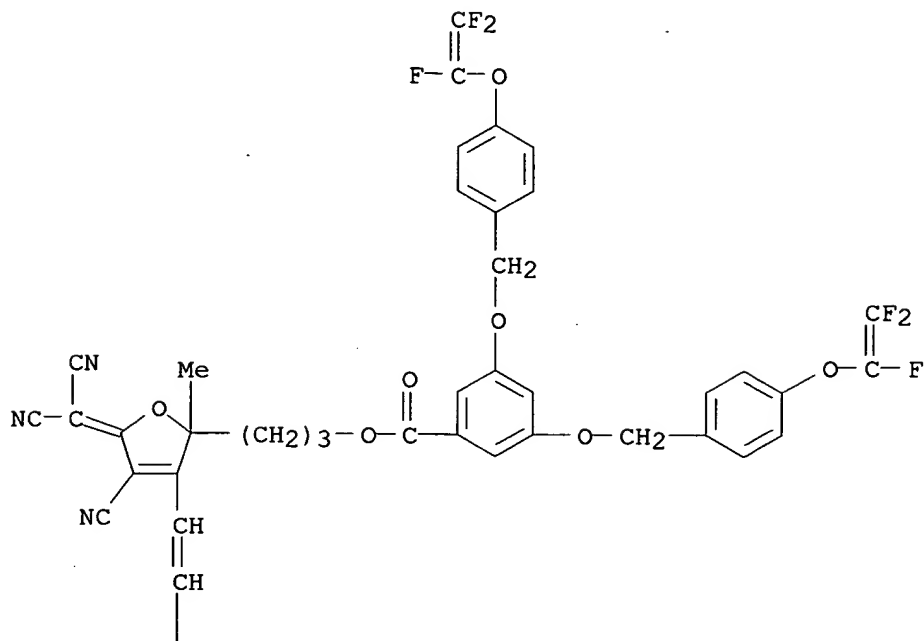
CN Benzoic acid, 3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]-, 3-[4-cyano-5-(dicyanomethylene)-3-[2-[5-[4-[4-[ethyl(6-hydroxyhexyl)amino]phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-2,5-dihydro-

9/20/2005

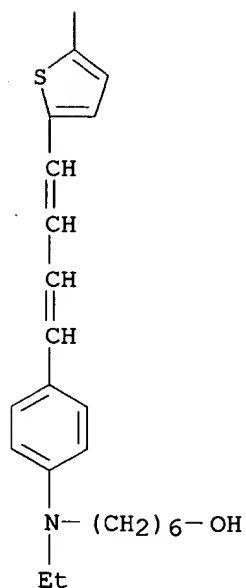
09/912,444

2-methyl-2-furanyllpropyl ester (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 2-A



IT 502449-17-4P 502449-19-6P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT

9/20/2005

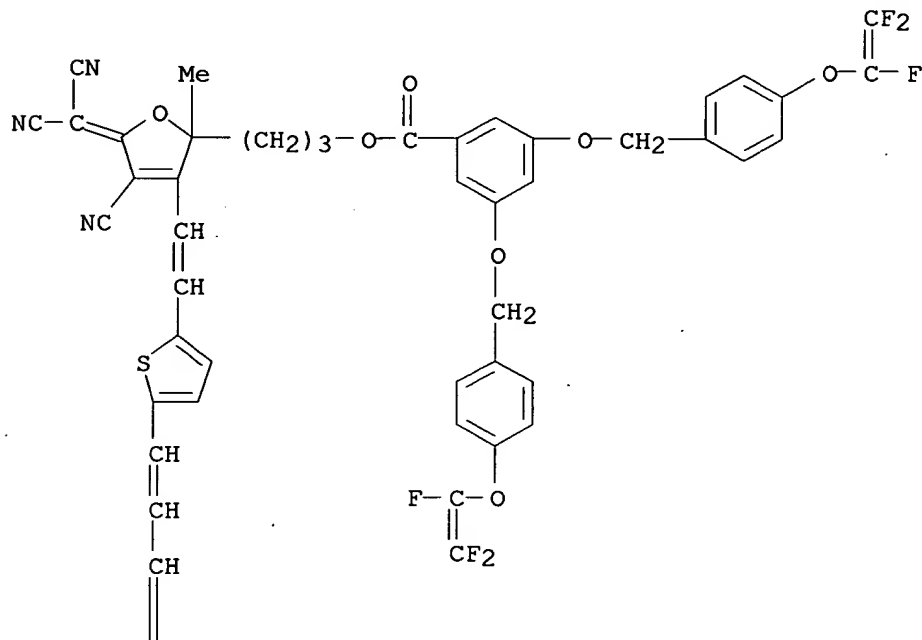
(Reactant or reagent)

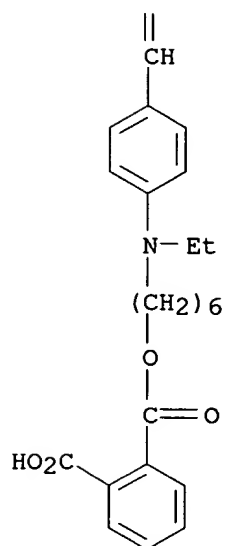
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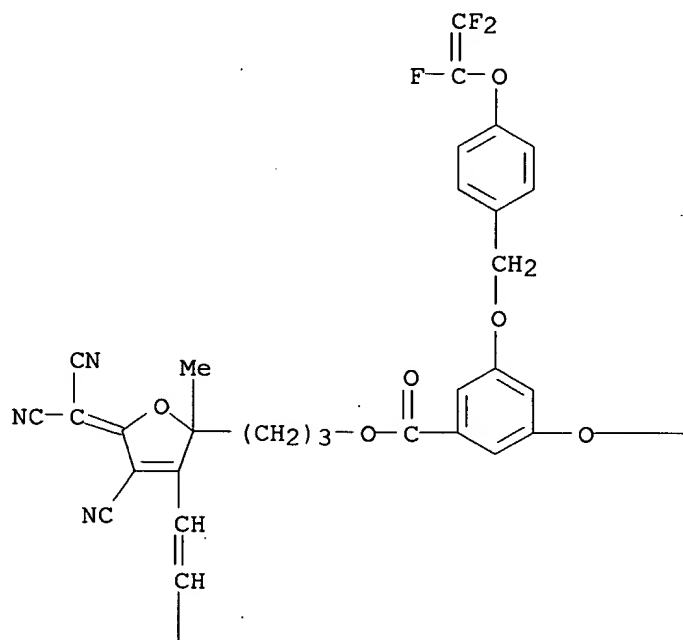
CN 1,2-Benzenedicarboxylic acid, mono[6-[[4-[4-[5-[2-[2-[3-[[3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]benzoyl]oxy]propyl]-4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-3-furanyl]ethenyl]-2-thienyl]-1,3-butadienyl]phenyl]ethylamino]hexyl] ester (9CI) (CA INDEX NAME)

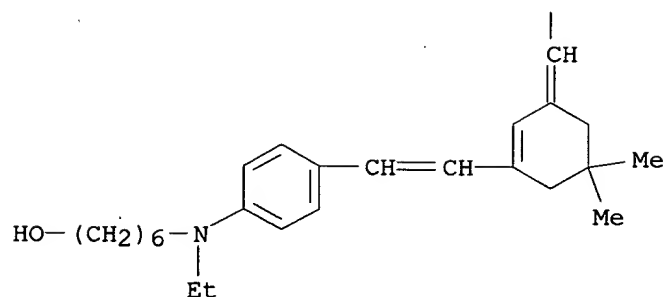
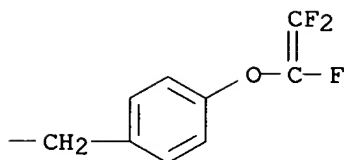
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RN 502449-19-6 CA
 CN Benzoic acid, 3,5-bis[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]-, 3-[4-cyano-5-(dicyanomethylene)-3-[3-[3-[2-[4-[ethyl (6-hydroxyhexyl) amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-2,5-dihydro-2-methyl-2-furanyl]propyl ester (9CI) (CA INDEX NAME)





IT 502558-65-8P 502558-68-1P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
(design, synthesis, and properties of highly efficient side-chain
dendronized **nonlinear optical** polymers for
electro-optics)

RN 502558-65-8 CA

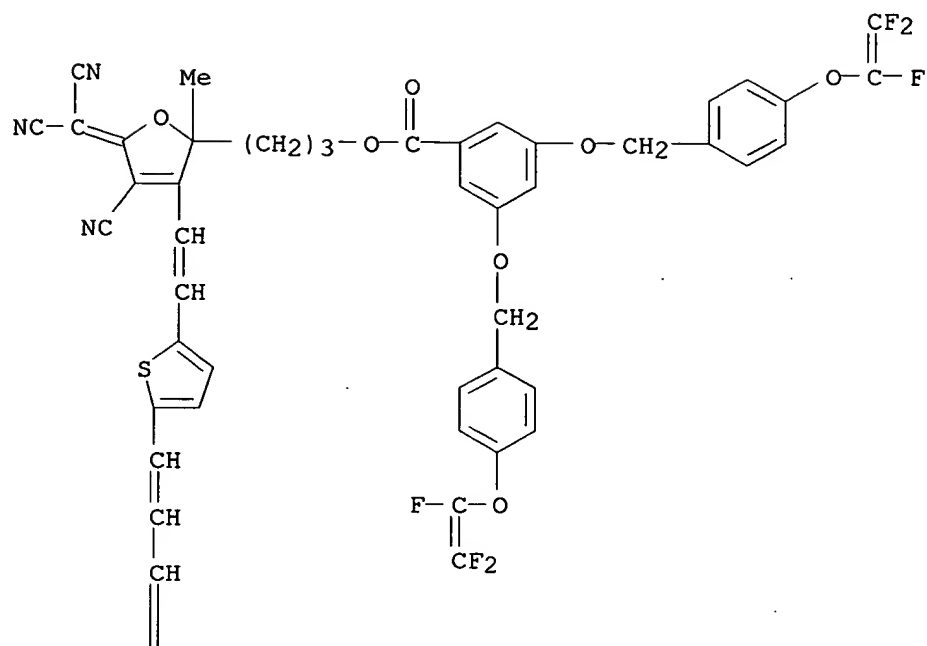
CN Phenol, 4-ethenyl-, homopolymer, 6-[[4-[4-[5-[2-[2-[3-[[3,5-bis[[4-
[(trifluoroethenyl)oxy]phenyl]methoxy]benzoyl]oxy]propyl]-4-cyano-5-
(dicyanomethylene)-2,5-dihydro-2-methyl-3-furanyl]ethenyl]-2-thienyl]-1,3-
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4-[(trifluoroethenyl)oxy]benzoate (9CI) (CA INDEX NAME)

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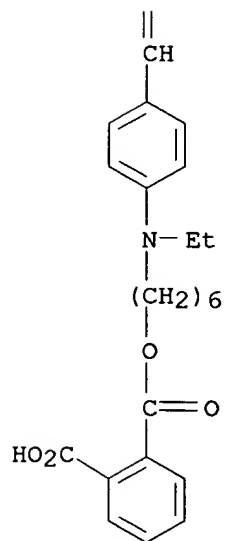
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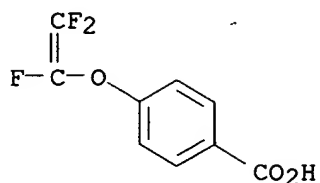
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CRN 134151-66-9
CMF C9 H5 F3 O3

09/912,444



CM 3

CRN 24979-70-2

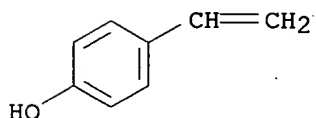
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CCI PMS

CM 4

CRN 2628-17-3

CMF C8 H8 O



RN 502558-68-1 CA

CN Phenol, 4-ethenyl-, homopolymer, 6-[[4-[2-[3-[3-[2-[3-[3,5-bis[[4-
[(trifluoroethenyl)oxy]phenyl]methoxy]benzoyl]oxy]propyl]-4-cyano-5-
(dicyanomethylene)-2,5-dihydro-2-methyl-3-furanyl]-2-propenylidene]-5,5-
dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]ethylamino]hexyl
1,2-benzenedicarboxylate 4-[(trifluoroethenyl)oxy]benzoate (9CI) (CA
INDEX NAME)

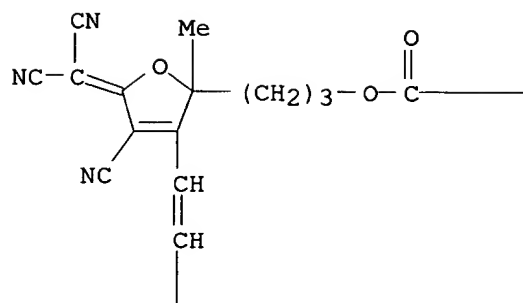
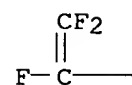
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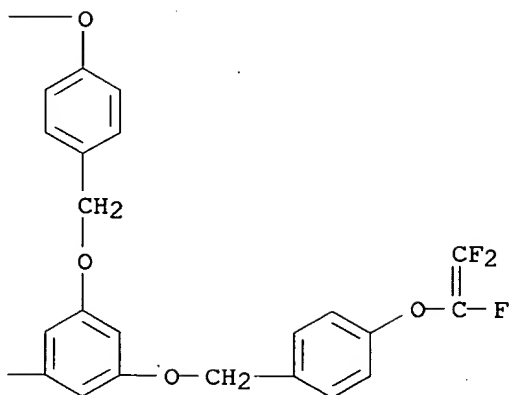
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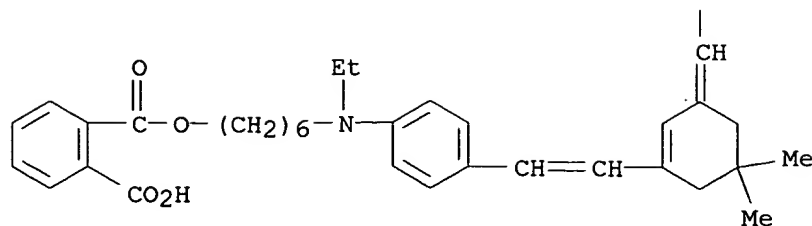
9/20/2005

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PAGE 1-B

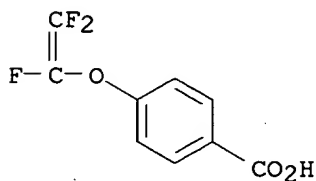




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CRN 134151-66-9

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CM 3

CRN 24979-70-2

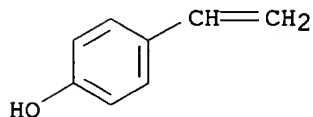
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CCI PMS

CM 4

CRN 2628-17-3

CMF C8 H8 O



L25 ANSWER 20 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 138:128790 CA
 ED Entered STN: 20 Feb 2003
 TI Novel **nonlinear optical** polymers incorporating amines
 IN Yu, Luping
 PA The University of Chicago, USA
 SO PCT Int. Appl., 68 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM G02F001-361
 ICS C07D333-04; C07D409-02; C07D409-04
 CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related

9/20/2005

Properties)

Section cross-reference(s): 37, 76

FAN.CNT 4

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2003007070	A1	20030123	WO 2002-US22532	20020715
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
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US 2003085388	A1	20030508	US 2002-196734	20020715
US 2003092869	A1	20030515	US 2002-196565	20020715
US 2003100681	A1	20030529	US 2002-196353	20020715
PRAI US 2001-305374P	P	20010713		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2003007070	ICM	G02F001-361
	ICS	C07D333-04; C07D409-02; C07D409-04
WO 2003007070	ECLA	C07D209/88; C07D333/60; C07D409/06+333B+239B; C07D409/06+333B+307B; C07D409/06+333B+333; C07D409/12+333B+209; C07D409/14+333B+239B+209; C07D409/14+333B+333+209; C08G073/10; C08G073/10F; G02F001/361D2; G02F001/361F2; G02F001/361F4; C07D333/22 385/122.000
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US 2003092869	NCL	528/170.000
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G02F001/361F4

- AB Compds. for forming **nonlinear optical** polymers are described by the general formula X-Y-Z, (X = (R1-O-CH2-CH2-)2N-; R1 = a labile group; Y is a thiophene oligomer terminated with attached to X via a 1,4-phenylene bridge; Z= is an electron-withdrawing group; and Y and Z in combination form a **nonlinear optical** chromophore). Polymerization of the compds. to form polymers, the polymers formed from the compds., and electrooptical devices (e.g., phase modulators, light intensity modulators, directional couplers, optical switches, optical waveguides, and bulk devices having variable indexes of refraction) employing the polymers are also described. The polymers can exhibit high thermal stability, which is believed to arise from their covalently bonded chromophore structures.
- ST **nonlinear optical** amine polymer electrooptical device; polyester **nonlinear optical** amine polymer; polyimide **nonlinear optical** amine polymer
- IT Optical couplers
(electro-; **nonlinear optical** polymers incorporating amines and electrooptical devices using them)
- IT Optical waveguides
(electrooptical; **nonlinear optical** polymers incorporating amines and electrooptical devices using them)
- IT Electrooptical materials
Electrooptical modulators
Electrooptical switches
Nonlinear optical materials
(**nonlinear optical** polymers incorporating amines and electrooptical devices using them)
- IT Polyesters, uses
Polyimides, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**nonlinear optical** polymers incorporating amines and electrooptical devices using them)
- IT 109-64-8, 1,3-Dibromopropane 5217-47-0 6911-87-1, 4-Bromo-N-methylaniline 10294-33-4, Boron tribromide 32479-73-5 61822-18-2, 2,7-Dimethoxy carbazole 74228-25-4 80522-42-5 90110-08-0 133532-50-0
RL: RCT (Reactant); RACT (Reactant or reagent)
(**nonlinear optical** polymers incorporating amines and electrooptical devices using them)
- IT 488809-45-6P 488809-46-7P 488809-47-8P 488809-48-9P 488809-49-0P
488809-50-3P 488809-51-4P 488809-52-5P 488809-53-6P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(**nonlinear optical** polymers incorporating amines and electrooptical devices using them)
- IT 488809-54-7P 488809-55-8P 488809-56-9P 488809-61-6P
488809-63-8P 488809-65-0P
RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**nonlinear optical** polymers incorporating amines and electrooptical devices using them)
- RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD
- RE
- (1) Jen Kwan-Yue Alex; US 5688906 A 1997 CA
(2) Pierre, L; WO 9511476 A 1995 CA
(3) Rhone Poulenc Chimie; EP 0384811 A 1990 CA
- IT **488809-63-8P**

RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(**nonlinear optical** polymers incorporating amines and electrooptical devices using them)

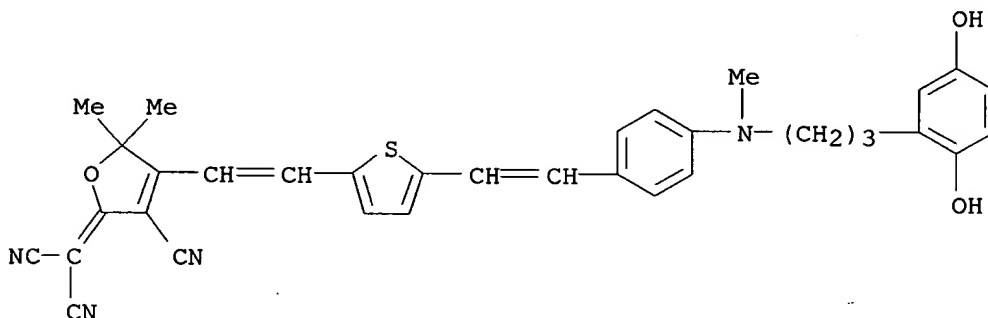
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CRN 488809-62-7

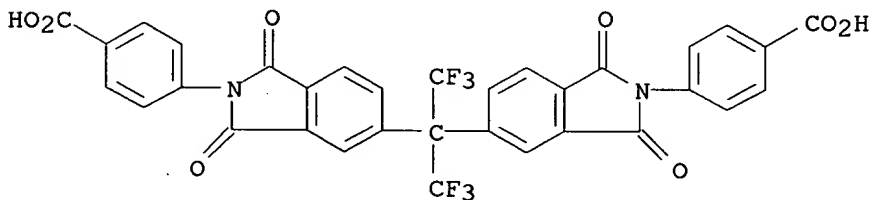
CMF C34 H30 N4 O3 S



CM 2

CRN 133532-50-0

CMF C33 H16 F6 N2 O8



L25 ANSWER 21 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 138:123276 CA
 ED Entered STN: 20 Feb 2003
 TI **Nonlinear optical** polymers, compositions, and their manufacture
 IN Yu, Luping
 PA The University of Chicago, USA
 SO PCT Int. Appl., 66 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM G02F001-361
 CC 37-3 (Plastics Manufacture and Processing)

FAN.CNT 4

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	WO 2003007071	A3	20030515		
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CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2003007071	ICM	G02F001-361
WO 2003007071	ECLA	C07D209/88; C07D333/60; C07D409/06+333B+239B; C07D409/06+333B+307B; C07D409/12+333B+209; C07D409/14+333B+239B+209; C07D409/14+333B+333+209; C08G073/10; C08G073/10F; G02F001/361D2; G02F001/361F2; G02F001/361F4
US 2003086666	NCL	385/122.000
	ECLA	C07D209/88; C07D211/94; C07D333/22; C07D333/60; C07D409/06+333B+333; C07D409/06+333B+307B; C07D409/06+333B+239B; C07D409/12+333B+209; C07D409/14+333B+333+209; C07D409/14+333B+239B+209; C08G073/10; C08G073/10F; G02F001/361D2; G02F001/361F2; G02F001/361F4
US 2003085388	NCL	252/582.000
	ECLA	C07D209/88; C07D211/94; C07D333/22; C07D333/60; C07D409/06+333B+333; C07D409/06+333B+307B; C07D409/06+333B+239B; C07D409/12+333B+209; C07D409/14+333B+333+209; C07D409/14+333B+239B+209; C08G073/10; C08G073/10F; G02F001/361D2; G02F001/361F2; G02F001/361F4
US 2003092869	NCL	528/170.000
	ECLA	C07D209/88; G02F001/361D2; G02F001/361F2; G02F001/361F4; C07D211/94; C07D333/22; C07D333/60; C07D409/06+333B+333; C07D409/06+333B+307B; C07D409/06+333B+239B; C07D409/12+333B+209; C07D409/14+333B+333+209; C07D409/14+333B+239B+209; C08G073/10; C08G073/10F
US 2003100681	NCL	525/242.000
	ECLA	C07D209/88; C07D211/94; C07D333/22; C07D333/60; C07D409/06+333B+239B; C07D409/06+333B+307B; C07D409/06+333B+333; C07D409/12+333B+209; C07D409/14+333B+239B+209; C07D409/14+333B+333+209; C08G073/10; C08G073/10F; G02F001/361D2; G02F001/361F2; G02F001/361F4

OS MARPAT 138:123276

9/20/2005

- AB These compns. include chromophoric monomer units that incorporate nonlinear optic chromophores, linking monomers that may be used to link chromophoric monomers, and polymers made from chromophoric monomers or chromophoric monomers in combination with linking monomers. The polymers can exhibit high thermal stability, which is believed to arise from their covalently bonded chromophore structures. In addition to their covalently bonded chromophore structures, nonlinear optic polymers may be crosslinked to further increase the thermal and dipole stability of the polymers.
- ST heat resistant nonlinear optic polyester polyimide; electron withdrawing group chromophore side chain polymer
- IT Electrooptical imaging devices
Heat-resistant materials
Nonlinear optical materials
(**nonlinear optical** polyester polyimide manufacture and property)
- IT Polyimides, preparation
RL: IMF (Industrial manufacture); PRP (Properties); PREP (Preparation)
(polyester-, fluorine group-containing; **nonlinear optical** polyester polyimide manufacture and property)
- IT Polyesters, preparation
RL: IMF (Industrial manufacture); PRP (Properties); PREP (Preparation)
(polyimide-, fluorine group-containing; **nonlinear optical** polyester polyimide manufacture and property)
- IT 488809-50-3P
RL: IMF (Industrial manufacture); PREP (Preparation)
(exchange of electron withdrawing group; **nonlinear optical** polyester polyimide manufacture and property)
- IT 488809-49-0P
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(intermediate deprotection for chromophoric monomers; **nonlinear optical** polyester polyimide manufacture and property)
- IT 488809-45-6P 488809-46-7P 488809-48-9P
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(intermediate for chromophoric monomers; **nonlinear optical** polyester polyimide manufacture and property)
- IT 488809-47-8P
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(intermediate hydrolysis for chromophoric monomers; **nonlinear optical** polyester polyimide manufacture and property)
- IT 488809-54-7P 488809-55-8P 488809-56-9P 488809-57-0P 488809-58-1P
488809-59-2P 488809-61-6P **488809-63-8P** 488809-65-0P
488831-45-4P 488832-61-7P 488832-64-0P
RL: IMF (Industrial manufacture); PRP (Properties); PREP (Preparation)
(**nonlinear optical** polyester polyimide manufacture and property)
- IT 109-64-8, 1,3-Dibromopropane 150-13-0, 4-Aminobenzoic acid 429-41-4, Tetrabutylammonium fluoride 1107-00-2 6911-87-1 61822-18-2
RL: RCT (Reactant); RACT (Reactant or reagent)
(**nonlinear optical** polyester polyimide manufacture and property)
- IT 133532-50-0P 488809-51-4P 488809-52-5P 488809-53-6P
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(preparation and polymerization; **nonlinear optical** polyester polyimide manufacture and property)

09/912,444

IT 80522-42-5

RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction with diol; **nonlinear optical** polyester
polyimide manufacture and property)

IT 90110-08-0

RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction with iso-Pr silyl protected diol; **nonlinear
optical** polyester polyimide manufacture and property)

IT 488809-63-8P

RL: IMF (Industrial manufacture); PRP (Properties); PREP (Preparation)
(**nonlinear optical** polyester polyimide manufacture and
property)

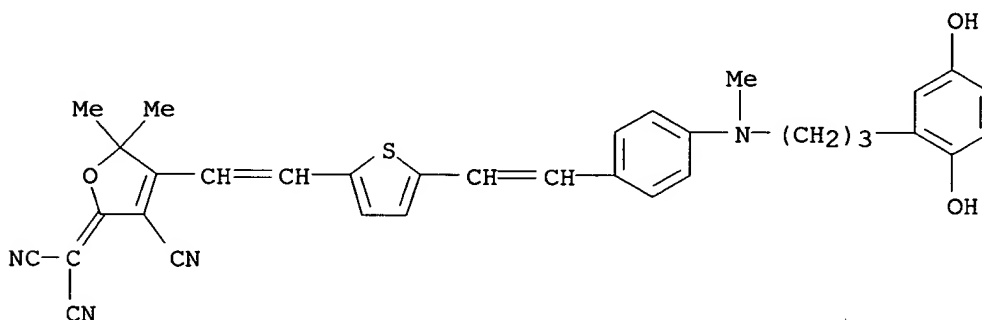
RN 488809-63-8 CA

CN Benzoic acid, 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis(1,3-
dihydro-1,3-dioxo-2H-isoindole-5,2-diyl)]bis-, polymer with
[3-cyano-4-[2-[5-[2-[4-[[3-(2,5-dihydroxyphenyl)propyl]methylamino]phenyl]
ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-
furanylidene]propanedinitrile (9CI) (CA INDEX NAME)

CM 1

CRN 488809-62-7

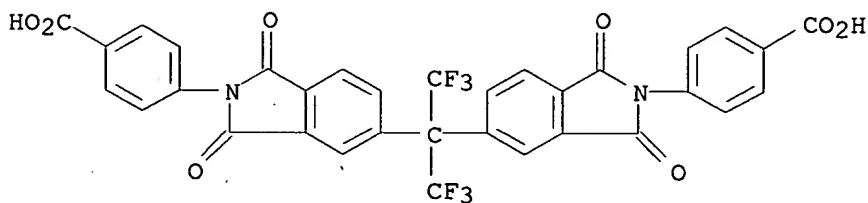
CMF C34 H30 N4 O3 S



CM 2

CRN 133532-50-0

CMF C33 H16 F6 N2 O8



L25 ANSWER 22 OF 28 CA COPYRIGHT 2005 ACS on STN

AN 138:123275 CA

ED Entered STN: 20 Feb 2003

TI **Nonlinear optical** polymers, compositions, and their
manufacture

9/20/2005

09/912,444

IN Yu, Luping
PA The University of Chicago, USA
SO PCT Int. Appl., 81 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM G02F001-361
CC 37-3 (Plastics Manufacture and Processing)
FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003007069	A2	20030123	WO 2002-US22376	20020715
	WO 2003007069	A3	20030410		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	US 2003086666	A1	20030508	US 2002-196328	20020715
	US 2003085388	A1	20030508	US 2002-196734	20020715
	US 2003092869	A1	20030515	US 2002-196565	20020715
	US 2003100681	A1	20030529	US 2002-196353	20020715
PRAI	US 2001-305374P	P	20010713		

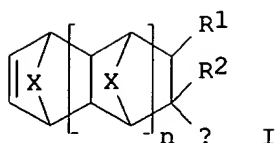
CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2003007069	ICM	G02F001-361
WO 2003007069	ECLA	C07D209/88; C07D333/22; C07D333/60; C07D409/06+333B+239B; C07D409/06+333B+307B; C07D409/12+333B+209; C07D409/14+333B+239B+209; C07D409/14+333B+333+209; C08G073/10; C08G073/10F; G02F001/361D2; G02F001/361F2; G02F001/361F4
US 2003086666	NCL	385/122.000
	ECLA	C07D209/88; C07D211/94; C07D333/22; C07D333/60; C07D409/06+333B+333; C07D409/06+333B+307B; C07D409/06+333B+239B; C07D409/12+333B+209; C07D409/14+333B+333+209; C07D409/14+333B+239B+209; C08G073/10; C08G073/10F; G02F001/361D2; G02F001/361F2; G02F001/361F4
US 2003085388	NCL	252/582.000
	ECLA	C07D209/88; C07D211/94; C07D333/22; C07D333/60; C07D409/06+333B+333; C07D409/06+333B+307B; C07D409/06+333B+239B; C07D409/12+333B+209; C07D409/14+333B+333+209; C07D409/14+333B+239B+209; C08G073/10; C08G073/10F; G02F001/361D2; G02F001/361F2; G02F001/361F4
US 2003092869	NCL	528/170.000
	ECLA	C07D209/88; G02F001/361D2; G02F001/361F2; G02F001/361F4; C07D211/94; C07D333/22; C07D333/60; C07D409/06+333B+333; C07D409/06+333B+307B; C07D409/06+333B+239B; C07D409/12+333B+209; C07D409/14+333B+333+209; C07D409/14+333B+239B+209; C08G073/10; C08G073/10F

9/20/2005

US 2003100681 NCL 525/242.000
 ECLA C07D209/88; C07D211/94; C07D333/22; C07D333/60;
 C07D409/06+333B+239B; C07D409/06+333B+307B;
 C07D409/06+333B+333; C07D409/12+333B+209;
 C07D409/14+333B+239B+209; C07D409/14+333B+333+209;
 C08G073/10; C08G073/10F; G02F001/361D2; G02F001/361F2;
 G02F001/361F4

GI



- AB These compns. include chromophoric monomer units that incorporate nonlinear optic chromophores, linking monomers that may be used to link chromophoric monomers, and polymers made from chromophoric monomers or chromophoric monomers in combination with linking monomers. The polymers can exhibit high thermal stability, which is believed to arise from their covalently bonded chromophore structures. In addition to their covalently bonded chromophore structures, nonlinear optic polymers may be crosslinked to further increase the thermal and dipole stability of the polymers. Thus, monomer I having electron withdrawing group Q (3-(dicyanomethylene)-2,3-dihydrobenzo[b]thiophene) (preparation given) was polymerized with the diacid
- II to give polyester polyimide having a λ_{max} 709, glass transition temperature 170°, and decomposition temperature 245°.
- ST heat resistant nonlinear optic polyester polyimide; electron withdrawing group chromophore side chain polymer
- IT Electrooptical imaging devices
- Heat-resistant materials
- Nonlinear optical materials**
 (nonlinear optical polyester polyimide manufacture and property)
- IT Polyimides, preparation
 RL: IMF (Industrial manufacture); PRP (Properties); PREP (Preparation)
 (polyester-, fluorine group-containing; **nonlinear optical** polyester polyimide manufacture and property)
- IT Polyesters, preparation
 RL: IMF (Industrial manufacture); PRP (Properties); PREP (Preparation)
 (polyimide-, fluorine group-containing; **nonlinear optical** polyester polyimide manufacture and property)
- IT 488809-50-3P
 RL: IMF (Industrial manufacture); PREP (Preparation)
 (exchange of electron withdrawing group; **nonlinear optical** polyester polyimide manufacture and property)
- IT 488809-49-0P
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
 (intermediate deprotection for chromophoric monomers; **nonlinear optical** polyester polyimide manufacture and property)
- IT 488809-45-6P 488809-46-7P 488809-47-8P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(intermediate for chromophoric monomers; **nonlinear optical** polyester polyimide manufacture and property)

IT 61822-18-2
RL: RCT (Reactant); RACT (Reactant or reagent)
(intermediate hydrolysis for chromophoric monomers; **nonlinear optical** polyester polyimide manufacture and property)

IT 488809-54-7P 488809-55-8P 488809-56-9P 488809-57-0P 488809-58-1P
488809-59-2P 488809-61-6P **488809-63-8P** 488809-65-0P
488831-45-4P 488832-61-7P 488832-64-0P
RL: IMF (Industrial manufacture); PRP (Properties); PREP (Preparation)
(**nonlinear optical** polyester polyimide manufacture and property)

IT 488809-48-9P
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(**nonlinear optical** polyester polyimide manufacture and property)

IT 109-64-8, 1,3-Dibromopropane 150-13-0, 4-Aminobenzoic acid 429-41-4,
Tetrabutylammonium fluoride 1107-00-2 6911-87-1
RL: RCT (Reactant); RACT (Reactant or reagent)
(**nonlinear optical** polyester polyimide manufacture and property)

IT 133532-50-0P 488809-51-4P 488809-52-5P 488809-53-6P
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(preparation and polymerization; **nonlinear optical** polyester polyimide manufacture and property)

IT 80522-42-5
RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction with diol; **nonlinear optical** polyester polyimide manufacture and property)

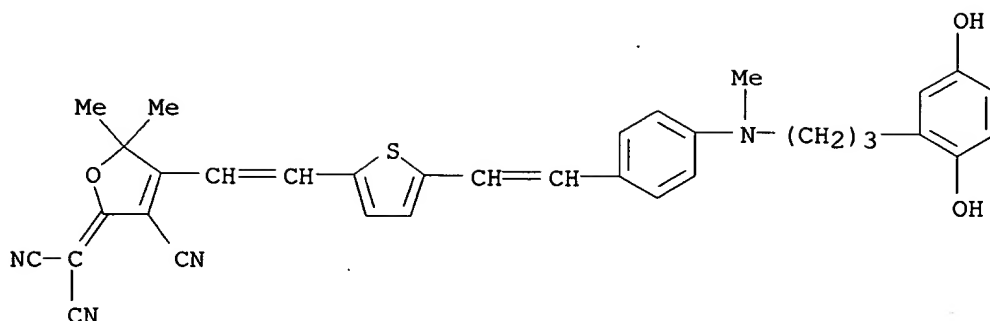
IT 90110-08-0
RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction with iso-Pr silyl protected diol; **nonlinear optical** polyester polyimide manufacture and property)

IT **488809-63-8P**
RL: IMF (Industrial manufacture); PRP (Properties); PREP (Preparation)
(**nonlinear optical** polyester polyimide manufacture and property)

RN 488809-63-8 CA
CN Benzoic acid, 4,4'-[[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis(1,3-dihydro-1,3-dioxo-2H-isoindole-5,2-diyl)]bis-, polymer with
[3-cyano-4-[2-[5-[2-[4-[[3-(2,5-dihydroxyphenyl)propyl]methylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanlylidene]propanedinitrile (9CI) (CA INDEX NAME)

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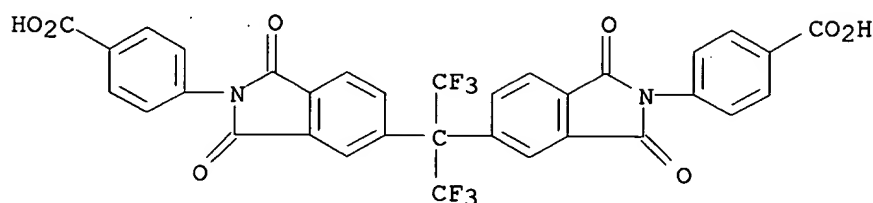
CRN 488809-62-7
CMF C34 H30 N4 O3 S



CM 2

CRN 133532-50-0

CMF C33 H16 F6 N2 O8



L25 ANSWER 23 OF 28 CA COPYRIGHT 2005 ACS on STN

AN 137:286134 CA

ED Entered STN: 31 Oct 2002

TI Synthesis of fluorinated molecules possessing high optical non-linearity, e.g., 2-[4-[3-[3-[2-[4-[bis-[2-[(tert-butyldimethylsilyl)oxy]ethyl]amino]phenyl]vinyl]-5,5-dimethylcyclohex-2-enylidene]propenyl]-3-cyano-5-methyl-5-(trifluoromethyl)-5H-furan-2-ylidene]malononitrile, useful as chromophores in electro-optic devices

IN Ermer, Susan; Lovejoy, Steven Michael; Bedworth, Peter V.

PA Lockheed Martin Corporation, USA

SO PCT Int. Appl., 12 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM C07D307-54

CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 27, 41

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002076969	A1	20021003	WO 2002-US9324	20020327
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU,				

9/20/2005

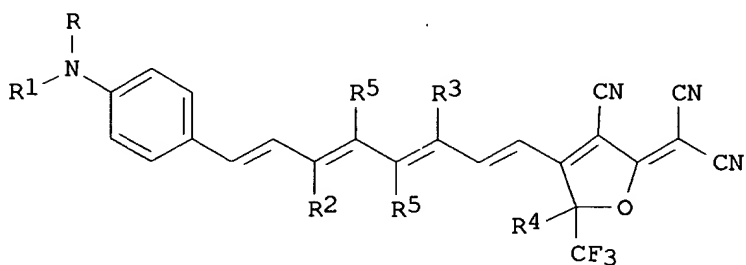
TJ, TM

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH,
CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR,
BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

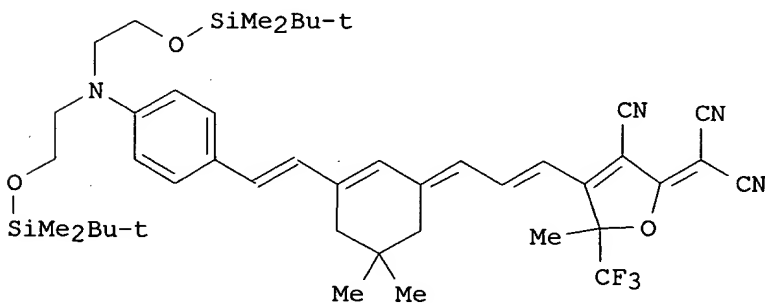
US 2004158084 A1 20040812 US 2004-473478 20040416
PRAI US 2001-278762P P 20010327
WO 2002-US9324 W 20020327

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2002076969	ICM	C07D307-54
WO 2002076969	ECLA	C07D307/68
US 2004158084	NCL	549/474.000
OS MARPAT 137:286134		
GI		



I



II

AB Invention compds. I [wherein R, R1-R5 can be selected from alkyl, aryl, heteroatom, substituted alkyl, or substituted aryl] are disclosed. The compds. are useful as chromophores in electro-optic devices (no data). A preferred invention compound is II, which can be prepared by Knoevenagel condensation of 2-(3-cyano-4,5-dimethyl-5-trifluoromethyl-5H-furan-2-ylidene)malononitrile (III) with the corresponding aldehyde. III is prepared in turn by reaction of 4,4,4-trifluoro-3-hydroxy-3-methylbutan-2-one with 2 equiv malononitrile in the presence of LiOH catalyst. Compds. I are said to show improvement over previous dyes because of the presence of the trifluoromethyl group on the acceptor portion of the mol. I can be poled at lower field, and have increased temporal stability (no data). Amorphous polycarbonate is reported to be a particularly useful polymer for incorporation of I.

ST fluorinated furanylidene malononitrile prepn chromophore dye

IT **nonlinear optical** electrooptical modulator

IT Chromophores

Dyes

Electrooptical modulators

Nonlinear optical materials

Optical hyperpolarizability

(preparation of fluorinated furanylidene malononitrile derivs. as organic chromophores for use as **nonlinear optical** materials in electrooptical devices)

IT Polycarbonates, uses

RL: DEV (Device component use); USES (Uses)

(preparation of fluorinated furanylidene malononitrile derivs. as organic chromophores for use as **nonlinear optical** materials in electrooptical devices)

IT **369609-49-4P**, 2-(3-Cyano-4,5-dimethyl-5-trifluoromethyl-5H-furan-2-ylidene)malononitrile

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(intermediate; preparation of fluorinated furanylidene malononitrile derivs. as organic chromophores for use as **nonlinear optical** materials in electrooptical devices)

IT **369609-51-8P**, 2-[4-[3-[3-[2-[4-[Bis-[2-[(tert-butyl)dimethylsilyl]oxy]ethyl]amino]phenyl]vinyl]-5,5-dimethylcyclohex-2-enylidene]propenyl]-3-cyano-5-methyl-5-(trifluoromethyl)-5H-furan-2-ylidene]malononitrile

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(invention compound; preparation of fluorinated furanylidene malononitrile derivs. as organic chromophores for use as **nonlinear optical** materials in electrooptical devices)

IT 109-77-3, Malononitrile 661-78-9, 4,4,4-Trifluoro-3-hydroxy-3-methylbutan-2-one 224784-28-5, [3-[2-[4-[Bis-[2-(tert-butyl)dimethylsilyloxy]ethyl]amino]phenyl]vinyl]-5,5-dimethylcyclohex-2-enylidene]acetaldehyde

RL: RCT (Reactant); RACT (Reactant or reagent)

(precursor; preparation of fluorinated furanylidene malononitrile derivs. as organic chromophores for use as **nonlinear optical** materials in electrooptical devices)

RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

(1) Liakatas, I; APPLIED PHYSICS LETTERS 2000, V76(11), P1368 CA

(2) Pacific Wave Ind Inc; WO 0009613 A 2000 CA

(3) Pacific Wave Ind Inc; WO 0179750 A 2001 CA

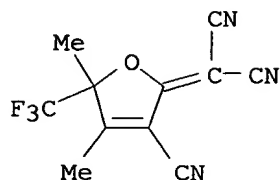
IT **369609-49-4P**, 2-(3-Cyano-4,5-dimethyl-5-trifluoromethyl-5H-furan-2-ylidene)malononitrile

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

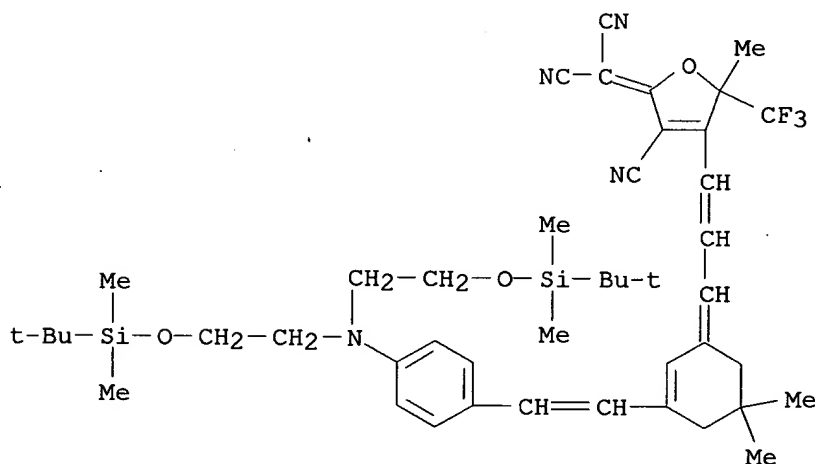
(intermediate; preparation of fluorinated furanylidene malononitrile derivs. as organic chromophores for use as **nonlinear optical** materials in electrooptical devices)

RN 369609-49-4 CA

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



IT **369609-51-8P**, 2-[4-[3-[3-[2-[4-[Bis-[2-[(tert-butyl)dimethylsilyl]oxy]ethyl]amino]phenyl]vinyl]-5,5-dimethylcyclohex-2-enylidene]propenyl]-3-cyano-5-methyl-5-(trifluoromethyl)-5H-furan-2-ylidene]malononitrile
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
 (invention compound; preparation of fluorinated furanylidene malononitrile derivs. as organic chromophores for use as **nonlinear optical** materials in electrooptical devices)
 RN 369609-51-8 CA
 CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5-methyl-5-(trifluoromethyl)-2(5H)-furanlylidene]- (9CI) (CA INDEX NAME)



L25 ANSWER 24 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 137:218033 CA
 ED Entered STN: 03 Oct 2002
 TI Functional materials for use in optical systems, their production and chromophores therefor
 IN Drotleff, Elizabeth; McGinniss, Vincent D.; Risser, Steven M.; Spahr, Kevin Bruce
 PA Battelle Memorial Institute, USA
 SO PCT Int. Appl., 232 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM G02B005-30
 ICS C07C017-42; C07C019-08; C07C021-18
 CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 41, 72

FAN.CNT 7

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002069002	A1	20020906	WO 2002-US3582	20020206
	W: AU, BR, CA, CN, CZ, ES, HU, ID, IL, JP, KR, MX, NO, NZ, PH, PL, RO, RU, SG, UA, US, VN, YU, ZA, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
	US 2002185633	A1	20021212	US 2001-777439	20010206
	US 6610219	B2	20030826		
	EP 1368679	A1	20031210	EP 2002-709386	20020206
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
PRAI	US 2001-777439	A	20010206		
	WO 2002-US3582	W	20020206		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
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WO 2002069002	ICM	G02B005-30
	ICS	C07C017-42; C07C019-08; C07C021-18
WO 2002069002	ECLA	G02B006/122C; G02F001/065
US 2002185633	NCL	252/582.000
	ECLA	G02B006/122C; G02F001/065
EP 1368679	ECLA	G02B006/122C; G02F001/065

OS MARPAT 137:218033

AB The present invention provides both polymer systems and optically active chromophores that may be used to form the components of optical devices such as optical switches and other devices useful in an optical waveguide. The polymers have glass transition temps. >100° and the systems have refractive index values of either 1.3-1.5 or 1.5-1.8 and have good compatibility with the electrooptical chromophores. In an example, an 8:2:30:60 acrylonitrile-3-(methacryloyloxy)propyltrimethoxysilane-Me methacrylate-trifluoroethyl methacrylate copolymer was prepared and combined with a 4-fluoro-3-nitroaniline chromophore to provide a low refractive index material.

ST polymer electrooptical chromophore compn optical system

IT **Nonlinear optical** materials

(electrooptical; optical materials based on polymers and electrooptical chromophores)

IT Electrooptical materials

(nonlinear; optical materials based on polymers and electrooptical chromophores)

IT Azo dyes

(optical materials based on polymers and electrooptical azo dyes)

IT **Nonlinear optical** materials

(optical materials based on polymers and electrooptical chromophores)

IT Fluoropolymers, uses

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(optical materials based on polymers and electrooptical chromophores)

IT Optical waveguides

(optical materials based on polymers and electrooptical chromophores for)

IT 454702-35-3

RL: TEM (Technical or engineered material use); USES (Uses)

(chromophore-containing polymer; optical materials based on polymers and electrooptical chromophores)

IT 121-01-7, 4-Nitro-2-(trifluoromethyl)aniline 364-76-1,
 4-Fluoro-3-nitroaniline 369-36-8, 2-Fluoro-5-nitroaniline 393-11-3,
 4-Nitro-3-(trifluoromethyl)aniline 776-16-9, 2,3,5,6-Tetrafluoro-4-
 nitroaniline 2429-84-7, C.I. Direct Red 1 17420-30-3,
 2-Cyano-4-nitroaniline 21397-11-5, 2-Fluoro-3-nitroaniline 23156-27-6
 72115-08-3, 3-Cyano-4-nitroaniline 122129-79-7, 3,5-Difluoro-4-
 nitroaniline 131858-36-1 198350-73-1 454702-34-2 454702-36-4,
 2,4,5,6-Tetrafluoro-3-nitroaniline 454702-37-5 454702-38-6
 454702-39-7 454702-40-0 454702-41-1 454702-42-2 454702-43-3
 454702-44-4 454702-45-5 454702-46-6 454702-47-7 454702-48-8,
 3-Cyano-4-nitro-2-(trifluoromethyl)aniline 454702-49-9,
 5-Cyano-4-nitro-2-(trifluoromethyl)aniline 454702-50-2,
 2-Cyano-4-nitro-5-(trifluoromethyl)aniline 454702-51-3,
 2-Cyano-4-nitro-3-(trifluoromethyl)aniline 454702-52-4 454702-53-5
 454702-54-6 454702-55-7 454702-56-8 454702-57-9 454702-58-0
 454702-59-1 454702-60-4 454702-61-5 454702-62-6 454702-63-7
454702-64-8 454702-65-9 454702-66-0
 454702-67-1 454702-68-2 454702-69-3 454702-70-6 454702-71-7
 454702-72-8 454702-73-9 454702-74-0 454702-75-1 454702-76-2
 454702-77-3 454702-78-4 454702-79-5 454702-80-8

RL: TEM (Technical or engineered material use); USES (Uses)
 (chromophore; optical materials based on polymers and electrooptical
 chromophores)

IT 1306-23-6, Cadmium sulfide, uses 1306-24-7, Cadmium selenide, uses
 7631-86-9, Silica, uses 7789-75-5, Calcium fluoride, uses

RL: MOA (Modifier or additive use); USES (Uses)
 (filler; in optical materials based on polymers and electrooptical
 chromophores)

IT 454702-33-1P, Acrylonitrile-3-(methacryloyloxy)propyltrimethoxysilane-
 methyl methacrylate-trifluoroethyl methacrylate copolymer

RL: IMF (Industrial manufacture); TEM (Technical or engineered material
 use); PREP (Preparation); USES (Uses)
 (optical materials based on polymers and electrooptical chromophores)

IT 9011-14-7, PMMA 54802-79-8, Poly(trifluoroethyl methacrylate)

RL: TEM (Technical or engineered material use); USES (Uses)
 (optical materials based on polymers and electrooptical chromophores)

IT 84-74-2, Dibutyl phthalate 98-95-3, Nitrobenzene, uses 108-32-7,
 Propylene carbonate 117-81-7, Dioctyl phthalate 123-91-1, Dioxane,
 uses 15625-89-5, Trimethylolpropane triacrylate 42233-61-4, Dioctyl
 suberate

RL: NUU (Other use, unclassified); USES (Uses)
 (solvent; in optical materials based on polymers and electrooptical
 chromophores)

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Byker; US 6084702 A 2000 CA
- (2) Ducharme; US 5064264 A 1991 CA
- (3) Eckes; US 4323675 A 1982 CA
- (4) Elmasry; US 4666819 A 1987 CA
- (5) Newsham; US 5776374 A 1998 CA
- (6) Ouderkirk; US 5783210 A 1998 CA
- (7) Tapolsky; US 6001958 A 1999 CA

IT **454702-64-8 454702-65-9 454702-66-0**

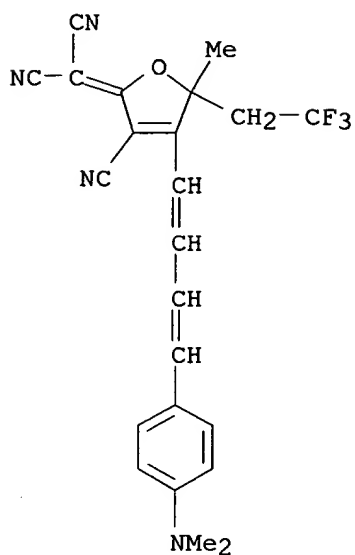
RL: TEM (Technical or engineered material use); USES (Uses)
 (chromophore; optical materials based on polymers and electrooptical
 chromophores)

RN 454702-64-8 CA

CN Propanedinitrile, [3-cyano-4-[4-[4-(dimethylamino)phenyl]-1,3-butadienyl]-

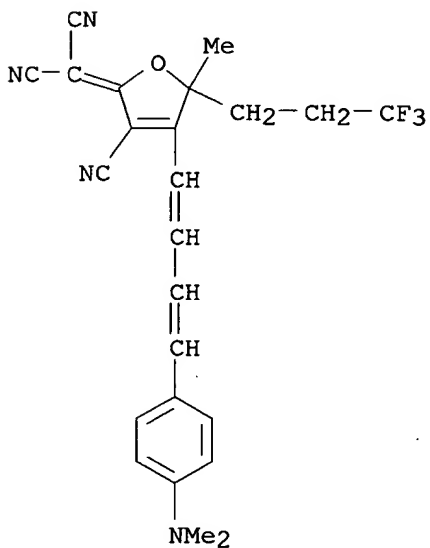
09/912,444

5-methyl-5-(2,2,2-trifluoroethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 454702-65-9 CA

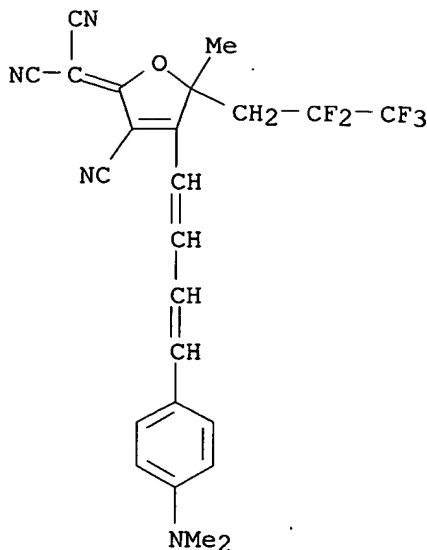
CN Propanedinitrile, [3-cyano-4-[4-[4-(dimethylamino)phenyl]-1,3-butadienyl]-5-methyl-5-(3,3,3-trifluoropropyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 454702-66-0 CA

CN Propanedinitrile, [3-cyano-4-[4-[4-(dimethylamino)phenyl]-1,3-butadienyl]-5-methyl-5-(2,2,3,3,3-pentafluoropropyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

9/20/2005



L25 ANSWER 25 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 136:316685 CA
 ED Entered STN: 09 May 2002
 TI Polymers containing polyene-bridged second-order **nonlinear**
optical chromophores and devices incorporating the same
 IN Zhang, Cheng; Fetterman, Harold R.; Steier, William; Michael, Joseph
 PA Pacific Wave Industries, Inc., USA
 SO PCT Int. Appl., 53 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM G02F001-35
 ICS F21V009-00
 CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related
 Properties)
 Section cross-reference(s): 38

FAN.CNT 10

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002029488	A1	20020411	WO 2001-US29239	20010918
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	US 6652779	B1	20031125	US 2000-679937	20001005
	AU 2001092779	A5	20020415	AU 2001-92779	20010918
PRAI	US 2000-679937	A	20001005		
	US 1998-122806	A2	19980727		
	US 2000-488422	A2	20000120		
	US 2000-546930	A2	20000411		

9/20/2005

US 2000-551685 A2 20000418
 WO 2001-US29239 W 20010918

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2002029488	ICM	G02F001-35
	ICS	F21V009-00
WO 2002029488	ECLA	G02F001/361F; G02F001/361F4
US 6652779	NCL	252/582.000; 359/328.000
	ECLA	C08K005/00P4; G02F001/361B; G02F001/361B2; G02F001/361D; G02F001/361D2; G02F001/361F; C09B023/00D; C09B023/00R; C09B023/00S; C09B023/14H; G02F001/065

- AB Second-order **nonlinear optical** device comprising an active element including a linear chain **nonlinear optical** polyester or poly(imide ester) formed by reacting a dihydroxy functionalized chromophore containing a π -conjugate polyene structure as the bridge or part of the bridge that connects an electron donor and electron acceptor with a monomer selected from an aromatic or aliphatic diacid or diacid dihalide and a monomer selected from an aromatic or aliphatic diol. The polyesters may be crosslinked using trifluoroether groups. Second-order **nonlinear optical** devices are also described which comprise an active element including a crosslinked **nonlinear optical** polymer material formed from dendritic or hyperbranched macromol. that carries ≥ 1 chromophores and thermally reactive groups at the periphery of the macromol. for crosslinking between the macromols. The dendrimers may each have a chromophore as the core and ≥ 1 dendrons that carry thermally reactive groups for crosslinking between the dendrimers. Tetrafluoroisophthaloyl dichloride.
- ST second order **nonlinear optical** device polyene bridged chromophore polymer
- IT Dendritic polymers
 Polyesters, uses
 RL: DEV (Device component use); USES (Uses)
 (**nonlinear optical**; second-order **nonlinear optical** devices employing polymers containing polyene-bridged second-order **nonlinear optical** chromophores)
- IT Optical instruments
 (nonlinear; second-order **nonlinear optical** devices employing polymers containing polyene-bridged second-order **nonlinear optical** chromophores)
- IT Polyimides, uses
 RL: DEV (Device component use); USES (Uses)
 (polyester-, **nonlinear optical**; second-order **nonlinear optical** devices employing polymers containing polyene-bridged second-order **nonlinear optical** chromophores)
- IT Polyesters, uses
 RL: DEV (Device component use); USES (Uses)
 (polyimide-, **nonlinear optical**; second-order **nonlinear optical** devices employing polymers containing polyene-bridged second-order **nonlinear optical** chromophores)
- IT **Nonlinear optical** materials
 (polymeric; second-order **nonlinear optical** devices employing polymers containing polyene-bridged second-order **nonlinear optical** chromophores)
- IT Electrooptical modulators

- (second-order **nonlinear optical** devices employing polymers containing polyene-bridged second-order **nonlinear optical** chromophores)
- IT 259653-89-9P 330982-78-0DP, reaction products with propanedinitrile furanylidene derivs. 410092-29-4DP, reaction products with ethylidynetrisphenyleneoxymethylenebenzoate 410092-31-8DP, reaction products with propanedinitrile furanylidene derivs. 410092-36-3DP, reaction products with ethylidynetrisphenyleneoxymethylenebenzoate 410093-47-9P
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
 (second-order **nonlinear optical** devices employing polymers containing polyene-bridged second-order **nonlinear optical** chromophores)
- IT 410093-46-8P
 RL: NUU (Other use, unclassified); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
 (second-order **nonlinear optical** devices employing polymers containing polyene-bridged second-order **nonlinear optical** chromophores)
- IT 83-55-6, 5-Amino-1-naphthol 89-32-7, 1,2,4,5-Benzenetetracarboxylic dianhydride 124-73-2 1107-00-2 1478-61-1, 4,4'-(Hexafluoroisopropylidene)diphenol 2351-36-2, 2,6-Naphthalenedicarbonyl dichloride 5930-28-9, 4-Amino-2,6-dichlorophenol 27955-94-8 110649-97-3 134151-79-4 224967-74-2 259653-88-8 330982-78-0 410092-31-8 410092-36-3 410093-49-1 410093-53-7
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (second-order **nonlinear optical** devices employing polymers containing polyene-bridged second-order **nonlinear optical** chromophores)
- IT 410092-29-4P 410092-86-3P 410093-48-0P 410093-50-4P 410093-51-5P 410093-52-6P 410093-54-8P
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
 (second-order **nonlinear optical** devices employing polymers containing polyene-bridged second-order **nonlinear optical** chromophores)
- RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
 (1) Dalton, L; J Mater Chem 1999, V9, P1905 CA
 (2) Dalton, L; Optical Engineering 2000, V39(3), P589 CA
 (3) Ma, H; Polymer Materials:Science and Engineering, Fall Meeting 2000, V83, P165 CA
 (4) Yokoyama, S; Thin Solid Films 1998, V331, P248 CA
 (5) Zhang, C; Polymer Preprints 1999, V40(2), P912 CA
 (6) Zhang, Y; Polymer 1997, V38(12), P2893 CA
- IT 259653-89-9P 410092-29-4DP, reaction products with ethylidynetrisphenyleneoxymethylenebenzoate 410093-47-9P
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
 (second-order **nonlinear optical** devices employing polymers containing polyene-bridged second-order **nonlinear optical** chromophores)
- RN 259653-89-9 CA
 CN 1,3-Benzenedicarbonyl dichloride, 2,4,5,6-tetrafluoro-, polymer with [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile and 4,4'-(2,2,2-trifluoro-1-

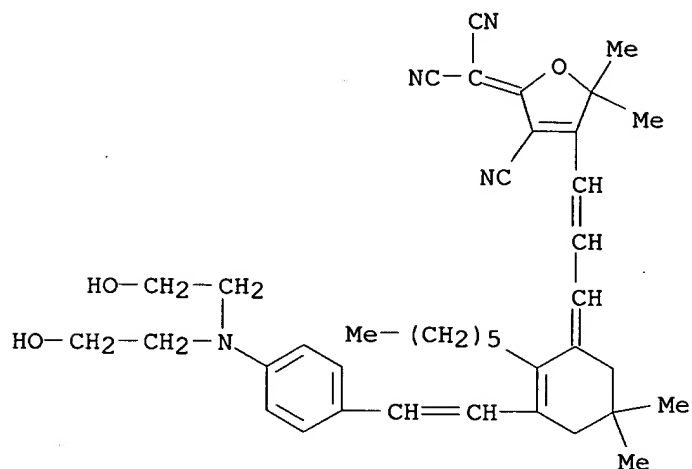
09/912,444

(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 259653-88-8

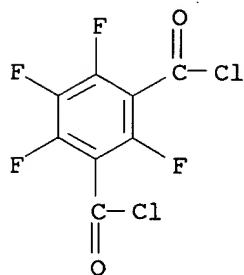
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CM 2

CRN 110649-97-3

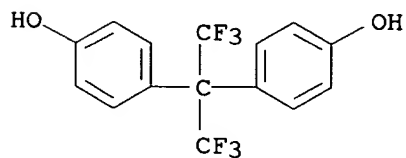
CMF C8 Cl2 F4 O2



CM 3

CRN 1478-61-1

CMF C15 H10 F6 O2

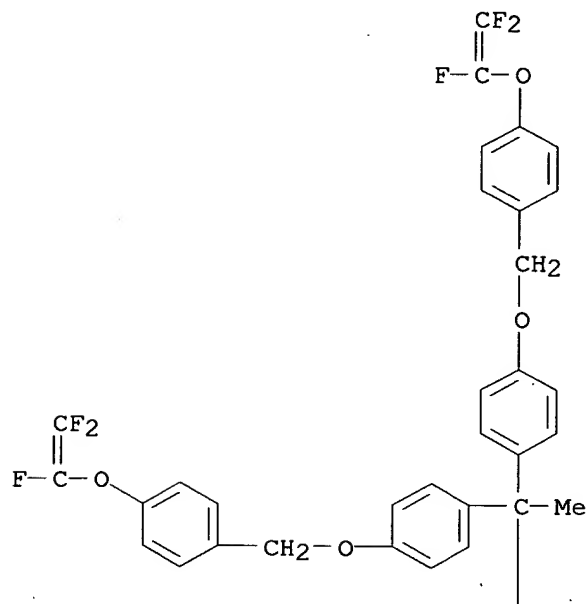


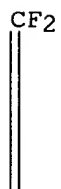
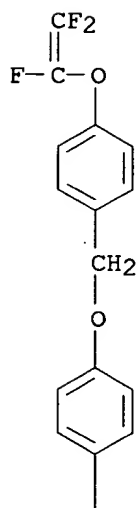
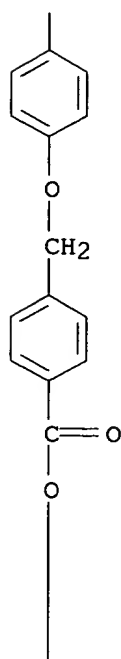
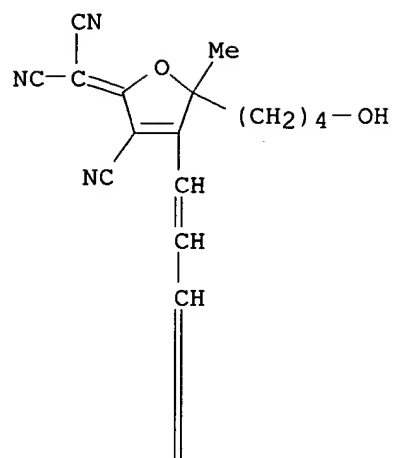
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9/20/2005

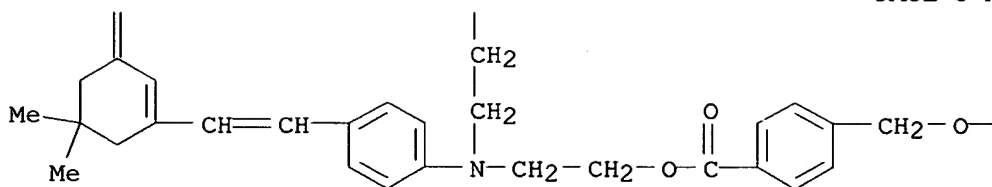
CN Benzoic acid, 4-[[4-[1,1-bis[4-[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]phenyl]ethyl]phenoxy]methyl]-, [[4-[2-[3-[3-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-(4-hydroxybutyl)-2-methyl-3-furanyl]-2-propenylidene]-5,5-dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

PAGE 1-A

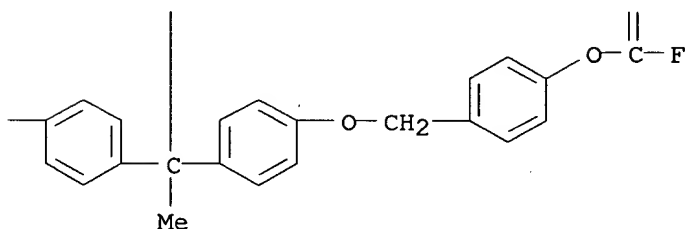




PAGE 3-A



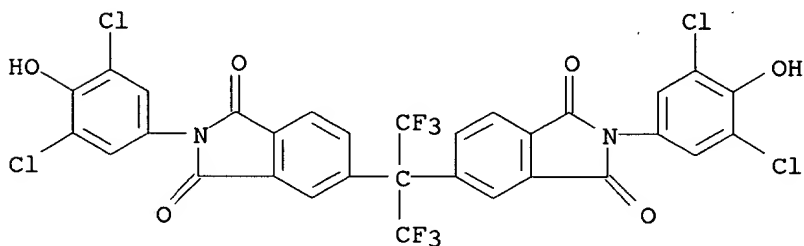
PAGE 3-B



RN 410093-47-9 CA
 CN 2,6-Naphthalenedicarbonyl dichloride, polymer with [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile and 5,5'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[2-(3,5-dichloro-4-hydroxyphenyl)-1H-isoindole-1,3(2H)-dione] (9CI) (CA INDEX NAME)

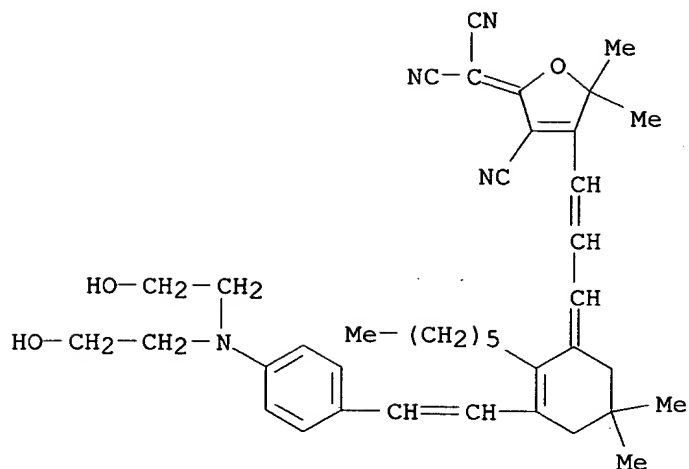
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CRN 410092-86-3
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CM 2

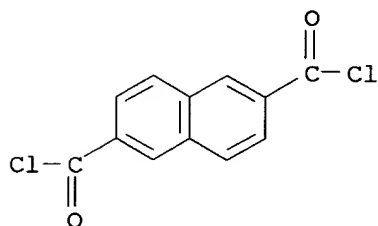
CRN 259653-88-8
 CMF C39 H48 N4 O3



CM 3

CRN 2351-36-2

CMF C12 H6 Cl2 O2



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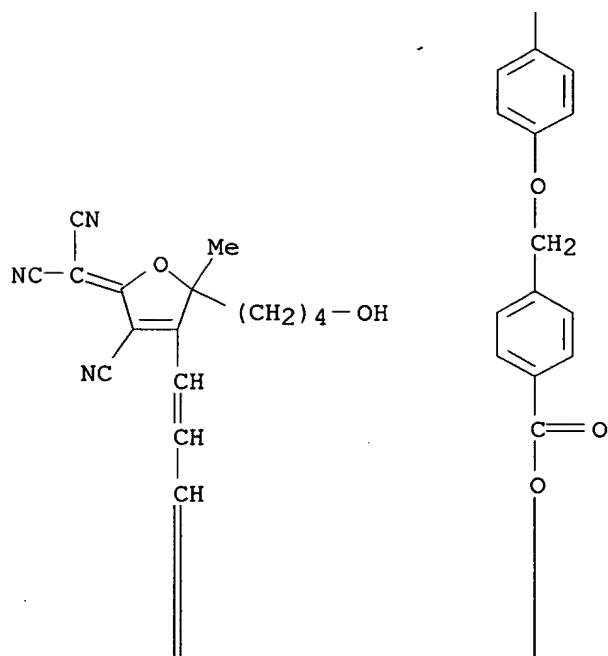
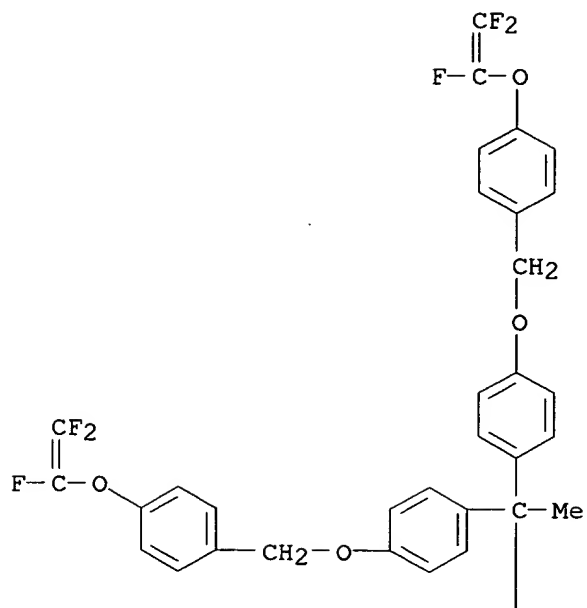
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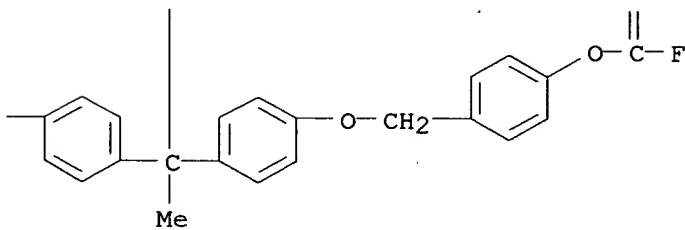
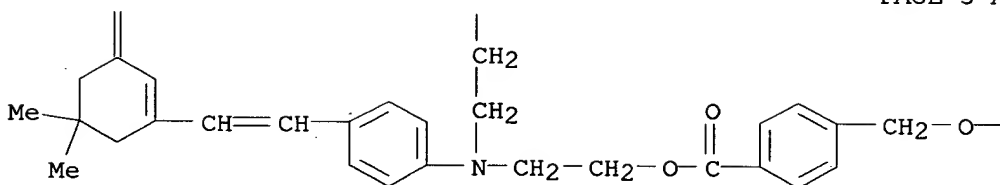
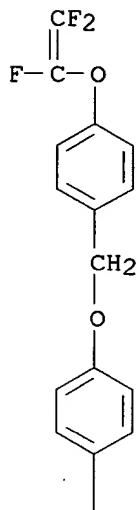
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(second-order **nonlinear optical** devices employing polymers containing polyene-bridged second-order **nonlinear optical** chromophores)

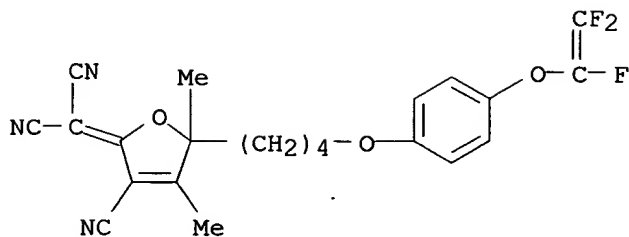
RN 410092-29-4 CA

CN Benzoic acid, 4-[[4-[1,1-bis[4-[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]phenyl]ethyl]phenoxy]methyl]-, [[4-[2-[3-[3-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-(4-hydroxybutyl)-2-methyl-3-furanyl]-2-propenylidene]-5,5-dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)



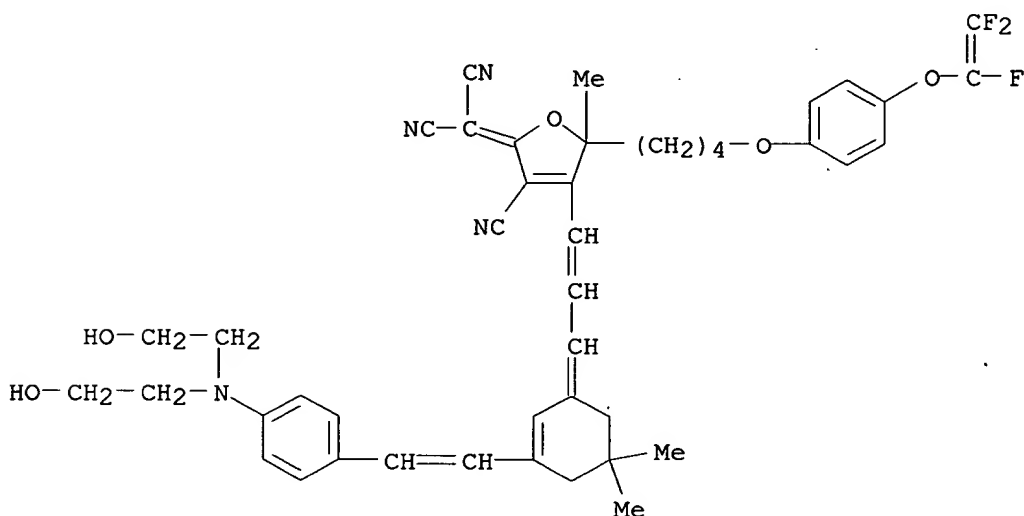


RN 410093-48-0 CA
 CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-[4-[4-
 [(trifluoroethenyl)oxy]phenoxy]butyl]-2(5H)-furanlidene]- (9CI) (CA
 INDEX NAME)



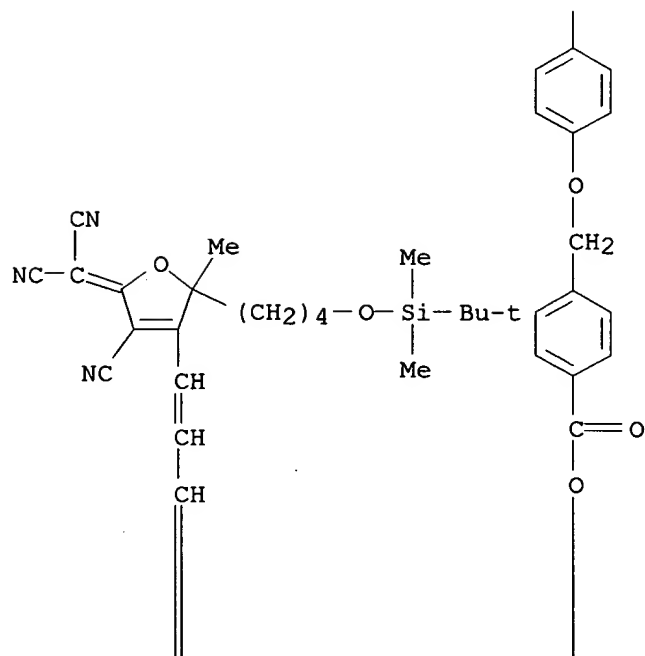
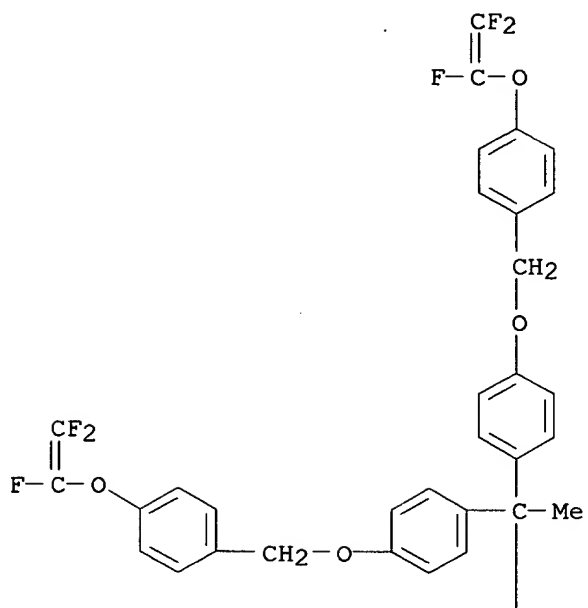
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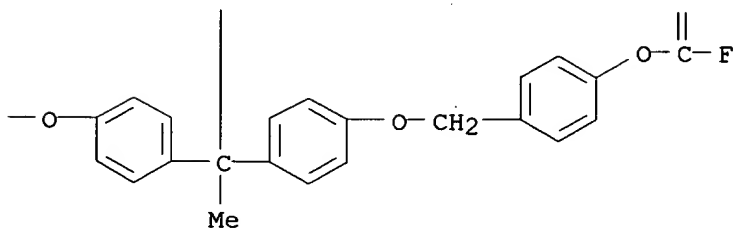
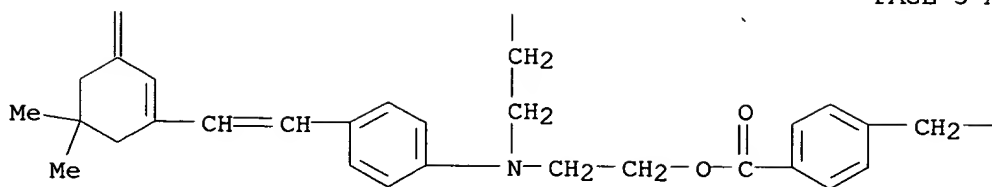
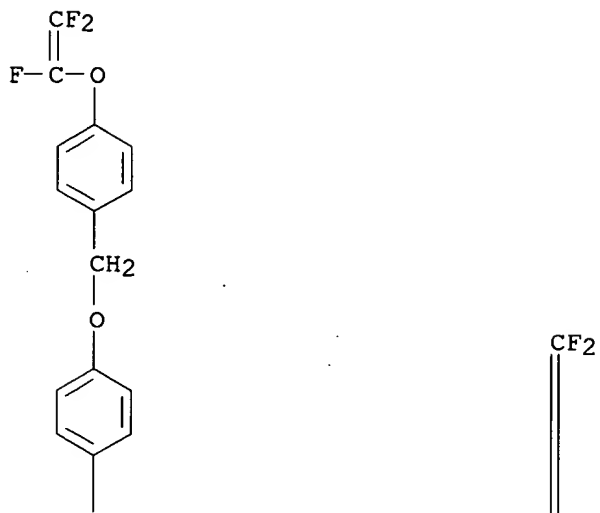
CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5-methyl-5-[4-[4-[(trifluoroethenyl)oxy]phenoxy]butyl]-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 410093-54-8 CA

CN Benzoic acid, 4-[[4-[1,1-bis[4-[[4-[(trifluoroethenyl)oxy]phenyl]methoxy]phenyl]ethyl]phenoxy]methyl]-, [[4-[2-[3-[3-[4-cyano-5-(dicyanomethylene)-2-[4-[(1,1-dimethylethyl)dimethylsilyl]oxy]butyl]-2,5-dihydro-2-methyl-3-furanyl]-2-propenylidene]-5,5-dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)





L25 ANSWER 26 OF 28 CA COPYRIGHT 2005 ACS on STN
 AN 136:191442 CA
 ED Entered STN: 14 Mar 2002
 TI Sterically stabilized polyene-bridged second-order **nonlinear**
optical chromophores and devices incorporating the same

9/20/2005

09/912,444

IN Zhang, Cheng; Fetterman, Harold R.; Steier, William; Michael, Joseph
PA Pacific Wave Industries, Inc., USA
SO U.S., 33 pp., Cont.-in-part of U.S. Ser. No. 546,930.
CODEN: USXXAM
DT Patent
LA English
IC ICM G02F001-00
ICS F21V009-00; H10S003-00
INCL 359321000
CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 41

FAN.CNT 10

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6348992	B1	20020219	US 2000-551685	20000418
	US 6067186	A	20000523	US 1998-122806	19980727
	US 6361717	B1	20020326	US 2000-488422	20000120
	US 6616865	B1	20030909	US 2000-546930	20000411
	US 6652779	B1	20031125	US 2000-679937	20001005
	WO 2001079750	A1	20011025	WO 2001-US12354	20010416
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG			
	US 2002027220	A1	20020307	US 2001-898625	20010703
	US 6555027	B2	20030429		
PRAI	US 1998-122806	A2	19980727		
	US 2000-488422	A2	20000120		
	US 2000-546930	A2	20000411		
	US 2000-551685	A2	20000418		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 6348992	ICM	G02F001-00
	ICS	F21V009-00; H10S003-00
	INCL	359321000
US 6348992	NCL	359/321.000; 252/582.000; 359/345.000
	ECLA	C08K005/00P4; C09B023/00D; C09B023/00R; C09B023/00S; C09B023/14H; G02F001/065; G02F001/361B; G02F001/361B2; G02F001/361D; G02F001/361D2; G02F001/361F
US 6067186	NCL	359/321.000; 252/582.000; 252/583.000; 385/002.000; 385/003.000
	ECLA	C08K005/00P4; C09B023/00D; C09B023/00R; C09B023/00S; C09B023/14H
US 6361717	NCL	252/582.000; 359/328.000
	ECLA	C08K005/00P4; C09B023/00D; C09B023/00R; C09B023/00S; C09B023/14H
US 6616865	NCL	252/582.000; 359/328.000
	ECLA	C08K005/00P4; C09B023/00R; C09B023/00S; C09B023/14H; G02F001/361B2; G02F001/361D2; G02F001/361F; C09B023/00D
US 6652779	NCL	252/582.000; 359/328.000
	ECLA	C08K005/00P4; G02F001/361B; G02F001/361B2;

9/20/2005

G02F001/361D; G02F001/361D2; G02F001/361F; C09B023/00D;
C09B023/00R; C09B023/00S; C09B023/14H; G02F001/065
WO 2001079750 ECLA G02F001/361B; G02F001/361B2; G02F001/361D;
G02F001/361D2
US 2002027220 NCL 252/582.000
ECLA C08K005/00P4; C09B023/00D; C09B023/00R; C09B023/00S;
C09B023/14H; G02F001/065; G02F001/361B; G02F001/361B2;
G02F001/361D; G02F001/361D2; G02F001/361F
OS MARPAT 136:191442
AB **Nonlinear optical** devices (e.g., electrooptical
modulators, phase shifters) are described which employ an active element
formed from a chromophore including an electron donor group, an electron
acceptor group, and a π -conjugate bridge structure between the electron
donor group and the electron acceptor group which includes ≥ 1
non-aromatic 5-, 6-, or 7-membered ring which lock(s) one or two
carbon-carbon double bond(s) of the conjugate bridge structure and in
which the electron acceptor group is connected to the bridge ring
structure with a conjugated diene or triene. The bridge may contain a
bithiophene unit. The chromophores may be doped into a polymer,
preferably a bisphenol A carbonate-4,4'-(3,3,5-
trimethylcyclohexylidene)diphenol carbonate copolymer. The devices may be
packaged in inert gas filled packages.
ST aminophenylpolyene bridged **nonlinear optical**
chromophore device
IT Electrooptical modulators
Nonlinear optical materials
(nonlinear optical devices employing sterically
stabilized polyene-bridged second-order **nonlinear**
optical chromophores)
IT Optical instruments
(nonlinear; **nonlinear optical** devices employing
sterically stabilized polyene-bridged second-order **nonlinear**
optical chromophores)
IT Optical instruments
(phase shifters; **nonlinear optical** devices
employing sterically stabilized polyene-bridged second-order
nonlinear optical chromophores)
IT 78-59-1, Isophorone
RL: RCT (Reactant); RACT (Reactant or reagent)
(Sterically stabilized polyene-bridged second-order **nonlinear**
optical chromophores and devices incorporating the same)
IT 7439-90-9, Krypton, uses 7440-01-9, Neon, uses 7440-37-1, Argon, uses
7440-59-7, Helium, uses 7440-63-3, Xenon, uses 7727-37-9, Nitrogen,
uses
RL: DEV (Device component use); USES (Uses)
(nonlinear optical device packages with protective
fills of; **nonlinear optical** devices employing
sterically stabilized polyene-bridged second-order **nonlinear**
optical chromophores)
IT 132721-26-7 224784-30-9 265992-52-7 266348-40-7 266348-41-8
296280-34-7 350251-11-5 351444-91-2 351444-93-4 351444-95-6
351444-98-9 351445-03-9 351445-05-1
RL: DEV (Device component use); USES (Uses)
(nonlinear optical devices employing sterically
stabilized polyene-bridged second-order **nonlinear**
optical chromophores)
IT **369609-51-8P**
RL: DEV (Device component use); RCT (Reactant); SPN (Synthetic

preparation); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)
 (nonlinear optical devices employing sterically
 stabilized polyene-bridged second-order nonlinear
 optical chromophores)

IT 259653-88-8P 351444-86-5P 369397-06-8P 369397-36-4P
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP
 (Preparation); USES (Uses)
 (nonlinear optical devices employing sterically
 stabilized polyene-bridged second-order nonlinear
 optical chromophores)

IT 109-77-3, Malononitrile 492-97-7, 2,2'-Bithiophene 1193-93-7
 1826-67-1, Vinylmagnesium bromide 2052-06-4 3761-92-0, Hexylmagnesium
 bromide 6502-13-2 7726-95-6, Bromine, reactions 27913-86-6
 127278-74-4 224768-42-7, 2-Hexylisophorone 326597-50-6 369395-86-8
 369609-49-4
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (nonlinear optical devices employing sterically
 stabilized polyene-bridged second-order nonlinear
 optical chromophores)

IT 10276-21-8P 51751-44-1P, 3,3'-Dibromo-2,2'-bithiophene 125143-53-5P,
 3,3',5,5'-Tetrabromo-2,2'-bithiophene 125607-30-9P, 3,3'-Dihexyl-2,2'-
 bithiophene 171082-32-9P 224768-43-8P 224784-25-2P 224784-26-3P
 224784-28-5P 326597-43-7P 351444-78-5P 369395-61-9P 369396-01-0P
 369396-52-1P 369396-68-9P 369397-34-2P 369397-35-3P 369397-37-5P
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT
 (Reactant or reagent)
 (nonlinear optical devices employing sterically
 stabilized polyene-bridged second-order nonlinear
 optical chromophores)

RE.CNT 75 THERE ARE 75 CITED REFERENCES AVAILABLE FOR THIS RECORD
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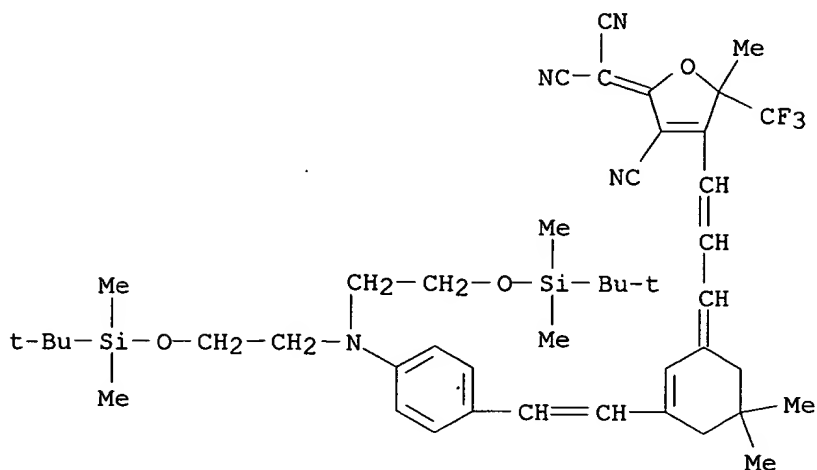
IT 369609-51-8P

RL: DEV (Device component use); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)
 (nonlinear optical devices employing sterically stabilized polyene-bridged second-order nonlinear optical chromophores)

RN 369609-51-8 CA

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-

cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5-methyl-5-(trifluoromethyl)-
2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



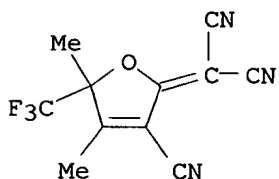
IT 369609-49-4

RL: RCT (Reactant); RACT (Reactant or reagent)

(**nonlinear optical** devices employing sterically
stabilized polyene-bridged second-order **nonlinear
optical** chromophores)

RN 369609-49-4 CA

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(trifluoromethyl)-2(5H)-
furanylidene]- (9CI) (CA INDEX NAME)



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